USAG HEIDELBERG

POTABLE WATER SYSTEM MASTER PLAN

This plan includes USAG-Heidelberg installations located in:

Heidelberg, Schwetzingen and Mannheim

29 July 2005

APPROVALS

This Potable Water System Master Plan (PWSMP, or master plan) and Water Emergency Contingency Plan (WECP, or contingency plan) address management and emergency planning requirements specific to USAG-Heidelberg's potable water systems.

This PWSMP satisfies the requirement to develop and maintain a master plan contained in Section 3-3b of the German Final Governing Standards (GFGS). This PWSMP must be reviewed and updated at least once every five years.

This WECP satisfies the requirement to develop and maintain a contingency plan contained in Section 3-3j of the GFGS, Section 4-3a of Army Regulation (AR) 420-49, Chapter 9 of Technical Bulletin (TB) No. MED 576, and Section D of Chapter 1 of Technical Manual (TM) 5-660. This WECP must be updated as information/data contained in the plan changes.

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LIST OF ACRONYMS AND ABBREVIATIONS

AFN	Armed Forces Network
AOD	Acting Officer of the Day
AR	Army Regulation
AST	Aboveground Storage Tank
AWWA	American Water Works Association
B&G	Buildings and Grounds
BLDG	Building
CBM	Cubic meters
CFR	Code of Federal Regulations
CHPPM-EUR	Center for Health Promotion and Preventive Medicine - Europe
CSC	Community Support Center
CUMACS	Computerized Utilities Management and Control System
DBCP	Dibromochloropropane
DeCA	Defense Commissary Association
DoD	Department of Defense
DPW	Directorate of Public Works
DWSP	Drinking Water Surveillance Program
EA	Executive Agent
ED	Environmental Division
EPA	See USEPA
ETS	Engineer Technical Services
FES	Fire and Emergency Services Division
FGS	Final Governing Standards
GC	Golf Course
GFGS	German Final Governing Standards
HB	Hammonds Barracks
HH	Heidelberg Heliport
IAW	In Accordance With
KK	Kilbourne Kaserne
KS	Koenigstuhl Radio Receiver Station
LN	Local National
m^3	Cubic meters
MCL	maximum contaminant level
MP	Military Police
MTV	Mark Twain Village

MVV	Mannheimer Versorgungs- und Verkehrsbetriebe
NK	Nachrichten Kaserne
O&M Div	Operation and Maintanance Division
PAO	Public Affairs Office
PB	Patton Barracks
PCB	polychlorinated bipheynl
PHV	Patrick Henry Village
PMA	Preventive Medicine Activity
POE	point-of-entry
POL	Petrol Oil Lubricants
POU	point-of-use
ppm	parts per million
PWSMP	Potable Water System Master Plan
SAR	Small Arms Range
SK	Stem Kaserne
SSA	Supply Support Activity
SWH	Stadtwerke Heidelberg
TB	Tompkins Barracks
TB	Technical Bulletin
THM	Trihalomethane
TM	Technical Manual
USAREUR	U.S. Army, Europe
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
WECP	Water Emergency Contingency Plan
WK	Wasserwerke Kurpfalz
XO	Executive Officer

DEFINITIONS

Action level is the concentration of a substance in water that determines the appropriate treatment for a water system. (FGS)
Appurtenances are structures, devices, and appliances, other than pipe and conduit, that are used in connection with a water distribution system, for example, valves, hydrants, corporation cocks, services, etc. (TM 5-660)
Backflow is the backing-up of water through a conduit or channel in the direction opposite to normal flow. (TM 5-660)
Backflow preventer is a device for a water supply pipe to prevent the backflow of water into the water supply system from the connections on its outlet end. (TM 5-660)
Backsiphonage is the flowing back of contaminated or polluted water from a plumbing fixture or cross-connection, into a water supply line, because of a lowering of the pressure in the line. Also termed "backflow." (TM 5-660)
Chlorination is the treatment of water by the addition of chlorine either as a gas or liquid, or in the form of hypochlorite, usually for the purposes of disinfection, oxidation, etc.
Chlorine residual is the total amount of chlorine (combined and free available chlorine) remaining in water at the end of a specified contact period following chlorination. (TM 5-660) Chlorine residual continues to prevent or inhibit microbial growth after the treated water enters the distribution system. Chlorine residual can protect against some post-treatment contamination that may result from improper cross-connections or main breaks and provides a way to monitor microbial water quality after the water leaves the treatment plant. (American Water Works Association)
Community water system is a public water system having at least 15 service connections used by year-round residents, or that regularly serves at least 25 of the same persons over six months per year. (FGS)
Cross-connection is a physical connection through which a supply of potable water could be contaminated, polluted, or infected. (TM 5-660)
Disaster is an event, natural or man-made, that is concentrated in time and space and that causes a community or a specific subdivision of a community to suffer danger or disruption of normal functions. Natural disasters include earthquakes, hurricanes, tornadoes, and floods; man-made disasters are events such as riots, strikes, and bomb blasts. (American Water Works Association)
Fire-flow is a term used to describe how much water can be delivered by a water system through one or more hydrants to fight a fire at a specific location or to state the optimum amount of water flow firefighters require for a theoretical fire at a specific location. The former is determined by a pipe's size, pressure, and internal condition and the latter based on standards developed through fire fighting experience. To meet fire-flow standards, a water distribution system must deliver large amounts of water in a relatively short period of time. (General)
Fluoridation is the addition of a chemical to increase the concentration of fluoride ions to a predetermined limit causing a reduction in the incidence of dental cavities. (TM 5-660)
Main is a pipeline on the discharge side of a water pumping station. (TM 5-660)
Non-public water system is a system that is not a public water system. (FGS)
Peak demand is the maximum monetary load placed on a water plant or pumping station (this is usually the maximum average load over a period of time such as peak hourly demand, peak daily demand, or instantaneous peak demand). (TM 5-660)
Potable water system, or water system, refers to both, a public water system and/or a non-public water system, and purchasers who have a distribution system and water storage facilities. (FGS)
Primary disinfection is the process of adding an oxidant (e.g., chlorine, chloramines, ozone) in order to kill or render harmless microbiological organisms that cause disease.
Public water system is a system for providing piped water to the public for human consumption, if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year. This term includes both "community water systems," which serve year-round residents, and "non-community water systems" along with any collection, treatment, storage, and distribution facilities under control of the operator of such systems, and any collection or pretreatment storage facilities not under such control that are used primarily in connection with such systems. A non-community system is used by intermittent users or travelers and is sub-classified as either a non-transient, non-community system or a transient, non-community system. (FGS)
Raw water is untreated water; usually the water entering the first treatment unit of a water treatment plant; water used as a source of water supply taken from a natural or impounded body of water, such as a stream, lake, pond, or groundwater aquifer. (TM 5-660)
Sanitary survey is an on-site review of the water source, facilities, equipment, operation, and maintenance of a public water system to evaluate the adequacy of such elements for producing and distributing potable water. (FGS)

Secondary disinfection is a treatment process designed to eliminate or reduce the levels of contaminants that affect the aesthetic quality of water.
Service connection is any pipeline, with its appurtenances, that branches off or connects with a water main and carries water from the main to a consumer. (TM 5-660)
Treated water is water that has undergone processing such as sedimentation, filtration, softening, disinfection, etc., and is ready for consumption. Included is purchased potable water that is retreated (e.g., chlorinated, fluoridated, etc.). (TM 5-660)
Valve is a device installed in a pipeline for the purpose of controlling the magnitude and direction of the flow. A valve consists essentially of a shell and disc or plug fitted to the shell. (TM 5-660)
Vulnerability assessment is an evaluation by DoD that shows whether contaminants of concern have been used in a watershed area and whether the source of water for the system is susceptible to contamination. Susceptibility is based on prior occurrence, vulnerability assessment results, environmental persistence, and transport of the contaminants, and any wellhead protection program results. (FGS)
Water quality is the chemical, physical, and biological characteristics of water with respect to its suitability for a particular purpose. The same water may be of good quality for one purpose or use, and bad for another, depending on its characteristics and the requirements for the particular use. (TM 5-660)
Water supply is, in general, the sources of water for public or private uses. (TM 5-660)
Water system, or potable water system, refers to a public water system and/or a non-public water system, and purchasers who have a distribution system and water storage facilities. (FGS)

1.0 INTRODUCTION

This Potable Water System Management Plan (PWSMP, or master plan) is developed for USAG-Heidelberg potable water systems. The development, maintenance, and implementation of this PWSMP lie within the Directorate of Public Works, Operation and Maintenance Division, Sanitation Branch for USAG-Heidelberg.

1.1 PURPOSE

The purpose of a PWSMP is to provide a management tool for the safe and continuous operation of a potable water system. This PWSMP satisfies the requirement to develop and maintain a master plan contained in Section 3.3.1 of the Final Governing Standards GFGS.
The PWSMP will provide potable water system managers the information necessary to assess the adequacy, reliability, and condition of potable water systems and will be actively maintained and updated as a living planning document specific to the water systems.
A copy of Chapter 3, Drinking Water, of the GFGS is included with this document as Appendix onCD.

1.2 REVISION

This PWSMP must be reviewed and updated at least once every 5 years IAW Section 3-3b of the FGS for Germany.

1.3 ROLES AND RESPONSIBILITIES

USAG-Heidelberg Commander
The USA Garrison Heidelberg Commander is ultimately responsible for providing potable water to all personnel living and working within the USAG-Heidelberg community under normal and emergency conditions. The Commander is also responsible for ensuring that the potable water systems within the community are adequately protected from natural and manmade disasters and that they are compliant with all applicable regulations and requirements.

Directorate of Public Works (DPW)
The DPW Director is the liaison between the DPW, Sanitation Branch and the Commander. The Director is responsible for maintaining open lines of communication between the Commander and the DPW, Sanitation Branch. The Director is responsible for ensuring that the Commander is aware of the status of the potable water and potable water distribution systems.

DPW, Operation and Maintenance Division, Sanitation Branch
The Sanitation Branch is the primary point-of-contact for all potable water related activities, management and information. The Sanitation Branch directs the various activities of those organizations working for/with the USAG-Heidelberg to ensure that the USAG-Heidelberg is provided potable water in accordance with all applicable regulations and requirements. The Sanitation Branch acts as the liaison for day-to-day operations between the various potable water suppliers and the USAG-Heidelberg. The Sanitation Branch is responsible for ensuring that the potable water is properly treated and monitored, maintaining appropriate monitoring and operations and maintenance records, and issuing notifications to appropriate personnel when exceedance occur or as required by the FGS Germany and/or Medical Authorities. The Sanitation Branch is also responsible for maintaining the Potable Water System Master Plan and for establishing and implementing the cross connection control and backflow prevention program and the annual water main flushing program. Sanitation Branch is responsible for ensuring that sanitary surveys are conducted at the required frequency. The Sanitation Branch provides expert advice and assistance to concerns and questions regarding the preparation of contracts and the processing and review of projects.

DPW, Fire and Emergency Services (FES)

The DPW, FES serves as one central notification point (Consolidated Fire Alarm Center (FAC) for all kinds of emergencies including potable water system emergencies) beside the MP. The FES will receive notification in case of a water related emergency and will initiate the management process IAW guidance of the DPW.

DPW, Engineering Technical Services Branch, Real Property Office

The Real Property Office is responsible for the continuous update of the potable water system maps. Whenever changes or modifications to the potable water system are completed the potable water system maps have to be updated. They are also responsible for maintaining a complete set of current potable water system maps.

U.S. Army Medical Hospital-Heidelberg (USAMH), Preventive Medicine Activity (PMA)
The PMA, Heidelberg, Germany, is responsible for conducting monthly or quarterly bacteriological and chlorine residual monitoring at selected locations IAW GFGS. They are also responsible for reporting the results of each monitoring event to Sanitation Branch in a timely manner.

U.S. Army Center for Health Promotion and Preventive Medicine – Europe (CHPPM-EUR)
The CHPPM-EUR is responsible for ensuring that the annual water quality monitoring of selected physical chemical and radionuclide parameters are conducted. The CHPPM-EUR is also responsible for conducting sanitary surveys of the potable water system.

2.0 POTABLE WATER SYSTEM DESCRIPTIONS

The USAG-Heidelberg operates 4 potable water systems. These potable water systems are differentiated by separate water sources. Table 2-1 identifies these potable water systems and lists the respective installations served by each water system.

Table 2-1. Identification of Potable Water Systems

Water System	Installations Served
Wasserwerk-Heidelberg (SWH)	Patrick Henry Village (PHV), Mark Twain Village (MTV), Nachrichten Kaserne (NK), Heidelberg Army Heliport (HH), Non Public Water System (less than 15 service connections) Community Support Center (CSC), Patton Barracks (PB), Radio Relay Station Königstuhl (KS) Non Public Water System (less than 15 service connections)
Wasserwerk-Mannheim (MVV) incl Schwetzingen:	Hammond Barracks (HB), Stem Kaserne (SK), Tompkins Barracks (TB), Kilbourne Kaserne (KK)
US-Owned Golf Course Wells - Non Public Water System	Golf Course (GC) Non Public Water System (less than 15 service connections)
US-Owned Small Arms Range Wells - Non Public Water System	Small Arms Range (SAR) Non Public Water System (less than 15 service connections)

Attached CD contains water distribution system maps for the identified water systems. Details on the individual potable water systems are provided in the following subsections.

2.0 WASSERVERBAND-KURPFALZ (WK)

Wasserverband-Kurpfalz is the overall water authority for this area. Local water suppliers SWH and MVV as units of WK, deliver water to the water distribution nets of Heidelberg, Schwetzingen and Mannheim, which are defined as Public Water Systems in the GFGS.
From these points potable water is distributed to USAG-Heidelberg's installations PHV, MTV, CB, NK, HH, CSC, PB, KS, HB, STE, TB, KK.

Particulars regarding the source, collection and transmission components, treatment components, distribution and storage components, power, and communication equipment are presented in Subsections 2.1.1 through 2.1.6.

2.1 STADTWERKE HEIDELBERG (SWH)

2.1.1 Source

Stadtwerke Heidelberg
Kurfürsten Anlage 48-50
69115 Heidelberg

is the local supplier for Heidelberg. The POC is

Mr. Kochowski
Tel. 06221-5132403
FAX 06221-5133331.
The locations of metered connections to the water supplier's mains are located close to building No.

PHV # 4534
MTV # 3667
MTV # 3749
NK # 3631
HH # 214
CSC # 3862
PB # 137
KS # 3585

The pressures/capacities of the mains is continuously 4 bar.
The existing contractual agreements are fixed in a power procurement contract.

2.1.2 Collection and Transmission Components

Source water is purchased so this subsection is not applicable.

CD contains water distribution system maps that detail Heidelberg area transmission lines (pipe length, pipe diameter, pipe material) and valves (valve type, valve diameter).

Other transmission components associated with WK are listed in Table 2-1a.

Table 2-1a. Heidelberg Area, Collection and Transmission Components

Component Description	Location
Pipe diameter DN50 – DN300	PHV DN300, MTV DN200 DN150, NK DN250, HH DN125, CSC DN150, PB DN150, KS DN50
Pipe material is cast iron and PE	PHV, MTV, NK, HH, CSC, PB, KS
Pipe length between 5 m –500 m	PHV, MTV, NK, HH,

	CSC, PB, KS
Main gate valves (see inventory list)	PHV, MTV 2ea. NK, HH, CSC, PB, KS
Main gate valve diameter DN50 – DN500	PHV DN300, MTV DN200 DN150, NK DN250, HH DN125, CSC DN150, PB DN150, KS DN50
Back flow prevention (see database at Sanitation Branch)	PHV, MTV, NK, HH, CSC, PB, KS.

2.1.3 Treatment Components

Treatment components associated with SWH are listed in Table 2-1b.

Table 2-1b. Heidelberg Area, Treatment Components

Component Description	Location
Chlorination Equipment (Electrolysis) Permanent chlorine reading at tank entrance and tank exit and at endpoints	PHV 4534, MTV 3667 and MTV 3749, NK 3631, HH 214, CSC 3862, PB 137
Fluoridation Equipment Permanent fluoride reading at tank exit	PHV 4534, MTV 3667 and MTV 3749

Metering Pumps with injectors for chemicals	PHV 4534, MTV 3667 and 3749, NK 3631, HH 214, CSC 3862, PB 137

2.1.4 Distribution and Storage Components

Appendix B contains water distribution system maps that detail communities served from SWH distribution lines (e.g., pipe length, pipe diameter, pipe material) and valves (valve type, valve diameter).
Other distribution and storage components associated are listed in Table 2-1c.

Table 2-1c. Installations served from SWH, Distribution and Storage Components

Component Description	Location	
Pipe diameter DN40 – DN300	PHV, MTV, NK, HH, CSC, PB, KS	
Pipe material is cast iron and PE	PHV, MTV, NK, HH, CSC, PB, KS	
Pipe length 44,809 m	PHV MTV NK HH CSC PB CB KS	21,421 m, 6,334 m, 3,348 m, 930 m, 1,528 m, 5,135 m, 4,939 m, 174 m.
Gate valves	PHV MTV	270 ea, 185 ea,

	NK	55 ea,
	HH	10 ea,
	CSC	45 ea,
	PB	60 ea,
	CB	60 ea,
	KS	5 ea.
Main valve diameter DN40 – DN300	PHV,	
	MTV,	
	NK,	
	HH,	
	CSC,	
	PB,	
	KS	
Water storage for fire prevention 2 ea.	PB,	
	KS 100 cbm (no connection to water net, no potable water)	
Reaction tanks for chlorination, Diameter DN1000	PHV	70 cbm,
	MTV	30 cbm 2 ea,
	NK	30 cbm,
	HH	15 cbm,
	CSC	30 cbm,
	PB	30 cbm
172 Hydrants (12 underground)	PHV,	
	MTV,	
	NK,	
	HH,	
	CSC,	
	PB,	
	KS	

2.1.5 Power

All electrical equipment associated with those communities that are served with water from SWH and their primary and emergency power sources are listed in Table 2-1d.

Table 2-1d. Heidelberg Area, Electrical Equipment and Power Sources

Description	Location	Primary Power Source	Emergency Power Source
OSEC	PHV, MTV,	Stadtwerke Heidelberg, ENBW	Available at: CB

	NK, HH, CSC, PB		
Pumps	PHV, MTV, NK, HH, CSC, PB, KS	Stadtwerke Heidelberg, ENBW	Available at: CB, MTV, PB, KS
Electronic Control Equipment	PHV, MTV, NK, HH, CSC, PB	Stadtwerke Heidelberg, ENBW	Available at: CB, MTV, PB, KS

2.1.6 Communications

Communication equipment associated with Heidelberg Area is listed in Table 2-1e.

Table 2-1e. Heidelberg Area, Communication Equipment

Equipment Description	Location
Alarm System	PHV, MTV, NK, HH, CSC, PB, CB
CUMACS	PHV, MTV, NK, HH, CSC, PB, CB
Cellular telephones	Maintenance crew, see telephone list and emergency personal list

2.2 MANNHEIMER VERSORGUNGS- UND VERKEHRSGESELLSCHAFT MBH (MVV)

2.2.1 Source

MVV,
Luisenring 49,
68159 Mannheim

is a local supplier for Schwetzingen and Mannheim. The POC is

Mr. Oswald
Tel. 0621-2900
FAX 0621-2902324.

The locations of metered connections to the water supplier's mains are located close to building No.

HB # 986,
SK # 1017,

TB # 4286 (incl. KK)

The pressures/capacities of the mains is continuously 4 bar.
The existing contractual agreements are fixed in the power procurement contract.

2.2.2 Collection and Transmission Components

The source water is purchased so this subsection is not applicable.

CD contains water distribution system maps updated December 2004 that detail MVV transmission lines (pipe length, pipe diameter, pipe material) and valves (valve type, valve diameter). Other transmission components associated with Mannheim area are listed in Table 2-2a.

Table 2-2a. Mannheim Area, Transmission Components

Component Description	Location
Pipe diameter DN100 – DN200	HB DN200, STE DN100, TB DN200, KK (hooked up to TB)
Pipe material is cast iron and PE	HB, STE, TB, KK
Pipe length between 5 m –500 m	HB, STE, TB, KK
Main gate valves (see inventory list)	HB, STE, TB,

	KK
Main gate valve diameter DN200 – DN500	HB DN200, STE DN100, TB DN200, KK (hooked up to TB)
Back flow prevention (see database at Sanitation Branch)	HB, STE, TB, KK

2.2.3 Treatment Components

Treatment components associated with Mannheim Area are listed in Table 2-2b.

Table 2-2b. Mannheim Area, Treatment Components

Component Description	Location
Chlorination Equipment (Electrolysis):	TB 4286, HB 986
Chlorination Equipment (Dosing):	STE 1017
Permanent chlorine reading at tank exit	all
Metering Pumps with injectors	HB 986, STE 1017, TB 4286.

2.2.4 Distribution and Storage Components

Appendix B contains water distribution system maps that detail communities served from MVV distribution lines (e.g., pipe length, pipe diameter, pipe material) and valves (valve type, valve diameter). Other distribution and storage components associated are listed in Table 2-2c.

Table 2-2c. Communities served from MVV, Distribution and Storage Components

Component Description	Location
Pipe diameter DN50 – DN200	HB, STE, TB, KK
Pipe material is cast iron and PE	HB, STE, TB, KK
Pipe length 6,768 m	HB 1,509 m,

	STE	1,014 m,
	TB	2,130 m,
	KK	2,115 m
Gate valves 128 ea. (see inventory list)	HB	25 ea,
	STE	10 ea,
	TB	85 ea,
	KK	32 ea
Main valve diameter DN50 – DN200	HB,	
	STE,	
	TB,	
	KK	
Reaction tanks for chlorination, Diameter DN1000	HB	20 cbm,
	STE	20 cbm
	TB	40 cbm
28 Hydrants	HB,	
	STE,	
	TB,	
	KK	

2.2.5 Power

All electrical equipment associated with those communities that are served with water from Mannheim Area and their primary and emergency power sources are listed in Table 2-2d.

Table 2-2d. Mannheim Area, Electrical Equipment and Power Sources

Description	Location	Primary Power Source	Emergency Power Source
OSEC	TB	Stadtwerke Heidelberg, ENBW	Available at: TB
Pumps	HB, STE, TB, KK	Stadtwerke Heidelberg, ENBW	Available at: TB
Electronic Control Equipment	HB, STE, TB, KK.	Stadtwerke Heidelberg, ENBW	Available at: TB, KK

2.2.6 Communications

Communication equipment associated with Mannheim Area is listed in Table 2-2e.

Table 2-2e. Mannheim Area, Communication Equipment

Equipment Description	Location
Alarm System	TB, SK, HB.
CUMACS	HB, TB, KK.
Cellular telephones	Maintenance crew see telephone list and emergency personal list

2.3 GOLF COURSE (GC) NON PUBLIC WATER SYSTEM

Golf Course water wells distribute water to the GC area and are defined as a Non Community Non Transient Water System in the GFGS. The GC has less than 15 service lines. It serves about 25 persons during duty hours.
Particulars regarding the source, collection and transmission components, treatment components, distribution and storage components, power, and communication equipment for Golf Course water wells are presented in Subsections 2.3.1 through 2.3.6

2.3.1 Source

Three (3) independent deep well pumps provide water for the GC. The deep wells are located close to the fenced water treatment facility, building 4103 at the GC. The wells' pipe reach down to approx. 23 meters deep. One well has a production capacity of 85 cbm/h, the other two wells 35 cbm/h each. The maximum production capacity is 155 cbm/h. Withdrawal permit allows 120 cmb/h. The wellheads are under the ground and they are secured with locks to prevent unauthorized access. POC is at the GC at Bldg # 4101, DSN 379-6139. Pressures/capacities of the mains is approx. 6-8 bars.

2.3.2. Collection and Transmission Components

Intake of the wells are equipped different sized gravel and sand and with filter tubes. Groundwater withdrawal pumping equipment takes place with pumps under water. A 10-cbm-pressure tank is located in bldg 4103, which is connected via cast iron pipes with the deep wells.
Appendix B contains water distribution system maps that detail GC collection and transmission lines (pipe length, pipe diameter, pipe material) and valves (valve type, valve diameter). Other collection and transmission components associated with GC are listed in Table 2-3a.

Table 2-3a. GC, Collection and Transmission Components

Component Description	Location
Pipe diameter DN150	GC
Pipe material is cast iron, PE, concrete	GC
Pipe length between 26,710 m	GC
Main gate valves (see inventory list)	GC
Main gate valve diameter DN150	GC
Back flow prevention (see database)	GC water station and point of entry to buildings
Contact Tank 10 cbm	GC # 4103

2.3.3 Treatment Components

Treatment components associated with GC are listed in Table 2-3b.

Table 2-3b. GC, Treatment Components

Component Description	Location
Chlorination Equipment	GC #4103
Manganese-/Ironing filter (Fa. Berkefeld)	GC #4103
Metering Pumps with injectors	GC #4103

2.3.4 Distribution and Storage Components

Appendix B contains water distribution system maps that detail GC distribution lines (e.g., pipe length, pipe diameter, pipe material) and valves (valve type, valve diameter). Other distribution and storage components associated with GC are listed in Table 2-3c.

Table 2-3c. GC, Distribution and Storage Components

Component Description	Location
Pipe diameter DN50 -DN150	GC
Pipe material is cast iron. Parts are PE and concrete	GC
Pipe length 26,710 m	GC
Gate valves 80 ea. (see inventory list)	GC
Main valve diameter DN150	GC
Pressure tank 10cbm (TUEV 2000) every 10Y	GC
2 Hydrants	GC

2.3.5 Power

All electrical equipment associated with GC and their primary and emergency power sources are listed in Table 2-3d.

Table 2-3d. GC, Electrical Equipment and Power Sources

Description	Location	Primary Power Source	Emergency Power Source
Pumps	GC #4103	EnBW	-
Filter	GC #4103	EnBW	-
Electronic Control Equipment	GC #4103	EnBW	-

2.3.5 Communications

Communication equipment associated with GC is listed in Table 2-3e.

Table 2-3e. GC, Communication Equipment

Equipment Description	Location
Alarm System	GC # 4103
CUMACS	GC # 4103
Cordless telephones	Maintenance Crew

2.4 SMALL ARMS RANGE (SAR) NON PUBLIC WATER SYSTEM

SAR water wells distribute water to the SAR area and are defined as a Non Community Non Transient Water System in the GFGS. The SAR has less than 15 service lines. It serves less than 25 persons during duty hours.
Particulars regarding the source, collection and transmission components, treatment components, distribution and storage components, power, and communication equipment for SAR water well are presented in Subsections 2.4.1 through 2.4.6.

2.4.1 Source

Two (2) independent deep well pumps within one well drill provide water for the SAR. The deep wells are located at building # 4136 at the SAR. The wells' pipe reach down to approx. 23 meters deep. Each well pump has a production capacity of 15 cbm/h. The maximum production capacity is 30 cbm/h. Withdrawal permit allows 30 cmb/h. The wellheads are inside a water plant. The building is secured with a locked fence and a locked building door to prevent unauthorized access. POC is at the SAR at bldg # 4130, DSN 373-5154. Pressures/capacities of the mains is approx. 6-8 bars.

2.4.2 Collection and Transmission Components

Intake of the wells are equipped different sized gravel and sand and with filter tubes. Groundwater withdrawal pumping equipment takes place with pumps under water. A 2-cbm storage tank is located in bldg 4136, which is connected via cast iron pipes with both deep well pumps.

Appendix B contains water distribution system maps that detail SAR collection and transmission lines (pipe length, pipe diameter, pipe material) and valves (valve type, valve diameter). Other collection and transmission components associated with SAR are listed in Table 2-4a.

Table 2-4a. SAR, Collection and Transmission Components

Component Description	Location
Pipe diameter DN100	SAR
Pipe material is cast iron, PE	SAR
Pipe length between 437 m	SAR
Main gate valves (see inventory list)	SAR
Main gate valve diameter DN100	SAR
Back flow prevention (data base)	SAR water station and point of entry to buildings
Contact tank 2 cbm	SAR # 4136

2.4.3 Treatment Components

Treatment components associated with SAR are listed in Table 2-4b.

Table 2-4b. SAR, Treatment Components

Component Description	Location
Chlorination Equipment	SAR #4136
Manganese-/Ironing filter (Fa. Berkefeld)	SAR #4136
Metering Pumps with injectors	SAR #4136

2.4.4 Distribution and Storage Components

Appendix B contains water distribution system maps that detail SAR distribution lines (e.g., pipe length, pipe diameter, pipe material) and valves (valve type, valve diameter). Other distribution and storage components associated with SAR are listed in Table 2-4c.

Table 2-4c. SAR, Distribution and Storage Components

Component Description	Location
Pipe diameter DN50 -DN100	SAR
Pipe material is cast iron and PE.	SAR
Pipe length 437 m	SAR
Gate valves 3 ea.	SAR
Main valve diameter DN100	SAR
Pressure tank 2cbm (TUEV 2000) every 10Y	SAR
1 Hydrant	SAR

2.4.5 Power

All electrical equipment associated with SAR and their primary and emergency power sources are listed in Table 2-4d.

Table 2-4d. SAR, Electrical Equipment and Power Sources

Description	Location	Primary Power Source	Emergency Power Source
Pumps	SAR # 4136	EnBW	-
Filter	SAR # 4136	EnBW	-
Electronic Control Equipment	SAR # 4136	EnBW	-

2.4.6 Communications

Communication equipment associated with SAR is listed in Table 2-5e.

Table 2-4e. SAR, Communication Equipment

Equipment Description	Location
Alarm System	SAR # 4136
CUMACS	SAR # 4136
Cordless telephones	Maintenance Crew

3.0 POPULATIONS SERVED AND POTABLE WATER DEMAND

This section presents the current populations served by USAG-Heidelberg's potable water systems and the normal water demands associated with the systems. This section also projects (5-year future) populations served and water demands for the same systems.

3.1 CURRENT POPULATION AND WATER DEMAND

Current populations served and current water demands are identified for each single potable water system. Current population data are based on information from DPW, ETS Branch and Housing Division maintained by DPW, O&M Division. Water demand data are based on information from WK and DPW, O&M Division, Power Procurement maintained by DPW, O&M Division.

The actual populations served by USAG-Heidelberg's potable water systems are stable (e.g., temporal variations in populations may exist, extended troop deployments may substantially decrease or increase populations, etc.). Some of these variations are easily defined and others are not. A narrative detailing such information, as it relates to the population served by the water systems, is recommended as the lead paragraph to each of the following subsections.

3.1.1 Heidelberg Area

Table 3-1a presents the current populations served by SWH. These populations are identified specific to individual installations/facilities served by the water system and categorized as nonresident military personnel, nonresident civilian personnel, and resident personnel. Populations are expressed as total persons served by the water system.
Table 3-1b presents the water demand for the Heidelberg area. Normal water demand is expressed as the annual average daily demand and the maximum daily water demand for the water system. Normal water demand is expressed as total cubic meters of water per day.
Table 3-1c divides the total water demand into individual elements and estimates the percentage of demand associated with each element.

Table 3-1a. Heidelberg Area Current and Projected Population Served (Numbers were provided from ET&S Branch and Housing Division on 15, June 2005)

Installation / Facility	Non-resident Military Personnel	Non-resident Civilian Personnel	Resident Personnel
PHV	29	712	3758
MTV/CB	199	742	1936
NK	658	341	75
HH	22	65	0
CSC	25	652	0
PB	469	402	293
KS	0	2	1

Table 3-1b. Heidelberg Area Current and Projected Water Demand (Data relying on annual water demands of 2004 from Power Procurement Branch)

Installation	Normal Daily Demand (based on annual average) m^3/day	Maximum Daily Demand m^3/day (=Daily Demand x 3)
PHV	1115	3345
MTV/CB	939	2817
NK	220	660
HH	6	18
CSC	91	273
PB	163	489
KS	1	3

Table 3-1c. Heidelberg Area Current and Projected Demand Elements

Demand Element	Percent of Total Demand
Consumption	2 %
Sanitation	93 %
Process Water (e.g., Air Conditioning)	1 %
Landscaping (Irrigation)	4 %

3.1.2 Mannheim Area

Table 3-2a presents the current populations served by MVV. These populations are identified specific to individual installations/facilities served by the water system and categorized as nonresident military personnel, nonresident civilian personnel, and resident personnel. Populations are expressed as total persons served by the water system.
Table 3-2b presents the water demand for Mannheim Area. Normal water demand is expressed as the annual average daily demand and the maximum daily water demand for the water system. Normal water demand is expressed as total cubic meters of water per day.
Table 3-2c divides the total water demand into individual elements and estimates the percentage of demand associated with each element.

Table 3-2a. Mannheim Area Current and Projected Population Served (Numbers were provided from ETS Branch and Housing Division)

Installation/Facility	Non-resident Military Personnel	Non-resident Civilian Personnel	Resident Personnel
HB	25	643	0
STE	21	71	0
TB	622	172	145
KK	155	132	0

Table 3-2b. Mannheim Area Current and Projected Water Demand (Data relying on water demands 2004)

Installation	Demand Normal Daily Demand (based on annual average) m^3/day	Maximum Daily Demand (Daily Demand x 3)
HB	21	63
STE	8	24
TB, KK	146	438

Table 3-2c. Mannheim Area Current and Projected Demand Elements

Demand Element	Percent of Total Demand
Consumption	2 %
Sanitation	93 %
Process Water (e.g., Air Conditioning)	1 %
Landscaping (Irrigation)	4 %

3.1.3 GC

Table 3-3a presents the current populations served by GC. These populations are identified specific to individual installations/facilities served by the water system and categorized as nonresident military personnel, nonresident civilian personnel, and resident personnel. Populations are expressed as total persons served by the water system.
Table 3-3b presents the water demand for GC. Normal water demand is expressed as the annual average daily demand and the maximum daily water demand for the water system. Normal water demand is expressed as total cubic meters of water per day.
Table 3-3c divides the total water demand into individual elements and estimates the percentage of demand associated with each element.

Table 3-3a. GC Current and Projected Population Served (Numbers were provided from EP&S Branch and Housing Division)

Installation / Facility	Non-resident Military Personnel	Non-resident Civilian Personnel	Resident Personnel
Golf Course	0	25	0

Table 3-3b. GC Current and Projected Water Demand (Data relying on water demands 2004)

Parameter	Demand (m^3/day)
Normal Daily Demand (based on annual average)	2
Maximum Daily Demand	9

Table 3-3c. GC Current and Projected Demand Elements

Demand Element	Percent of Total Demand
Consumption	2 %
Sanitation	83 %
Landscaping (Irrigation)	0 %
Process Water (e.g. Fe/Mn Filter)	15 %

3.1.4 SAR

Table 3-4a presents the current populations served by SAR. These populations are identified specific to individual installations/facilities served by the water system and categorized as nonresident military personnel, nonresident civilian personnel, and resident personnel. Populations are expressed as total persons served by the water system.
Table 3-4b presents the water demand for SAR. Normal water demand is expressed as the annual average daily demand and the maximum daily water demand for the water system. Normal water demand is expressed as total cubic meters of water per day.
Table 3-4c divides the total water demand into individual elements and estimates the percentage of demand associated with each element.

Table 3-4a. SAR Current and Projected Population Served (Numbers were provided from EP&S Branch and Housing Division)

Installation/Facility	Non-resident Military Personnel	Non-resident Civilian Personnel	Resident Personnel
SAR	19	6	0

Table 3-4b. SAR Current and Projected Water Demand (Data relying on water demands 2004)

Parameter	Demand (m^3/day)
Normal Daily Demand (based on annual average)	1
Maximum Daily Demand	10

Table 3-4c. SAR Current and Projected Demand Elements

Demand Element	Percent of Total Demand
Consumption	2 %
Sanitation	78%
Process Water (e.g. Fe/Mn Filter)	15 %
Landscaping	5 %

3.2 PROJECTED (5-YEAR FUTURE) POPULATION AND WATER DEMAND

Projected populations served and projected water demands are identified for each of potable water systems. Projected population data are based on composite knowledge from organizations (DPW, Housing Div. and DPW, ET&S) regarding planned staffing levels and operations. Projected water demand data are based on the projected populations and DPW knowledge of typical water demands.

3.2.1 Heidelberg Area

Table 3-2-1a presents the projected population (i.e., 5-year future population) to be served by SWH. These populations are also identified specific to individual installations/facilities served by the water system and categorized as non-resident military personnel, non-resident civilian personnel, and resident personnel. Populations are expressed as total persons served by the water system.
Table 3-2-1b presents the projected water demand for Heidelberg Area. Projected water demand is expressed in a manner identical to normal water demand, as a projected average daily demand and a projected maximum daily demand for the water system. Projected water demand is expressed as total cubic meters of water per day.
Table 3-2-1c divides the projected total water demand into elements and estimates the percentage of demand associated with each element.

Table 3-2-1a. Heidelberg Area Current and Projected Population Served

Installation/ Facility	Non-resident Military Personnel	Non-resident Military Personnel (5-year projection)	Non-resident Civilian Personnel	Non-resident Civilian Personnel (5-year projection)	Resident Personnel	Resident Personnel (5-year projection)
PHV	29	25	712	700	3758	4000
MTV	199	170	742	700	1936	2200
NK	658	620	341	300	75	100
HH	22	20	65	50	0	0
CSC	25	20	652	600	0	0
PB	469	450	402	400	293	300
KS	0	0	2	2	1	1

Table 3-2-1b. Heidelberg Area Current and Projected Water Demand

Installation	Demand (m^3/day)	Demand (m^3/day) (5-year projection)
PHV	1115	1000
MTV	939	900
NK	220	200
HH	6	5
CSC	91	80
PB	163	150
KS	1	1

Table 3-2-1c. Heidelberg Area Current and Projected Demand Elements

Demand Element	Percent of Total Demand	Percent of Total Demand (5-year projection)
Consumption	2 %	2 %
Sanitation	93 %	93 %
Process Water (e.g., Air Conditioning)	1 %	1 %
Landscaping (Irrigation)	4 %	4 %

3.2.2 Mannheim Area

3.2.2 Mannheim Area

Table 3-2-2a presents the projected population (i.e., 5-year future population) to be served by MVV. These populations are also identified specific to individual installations/facilities served by the water system and categorized as non-resident military personnel, non-resident civilian personnel, and resident personnel. Populations are expressed as total persons served by the water system.
Table 3-2-2b presents the projected water demand for Mannheim Area. Projected water demand is expressed in a manner identical to normal water demand, as a projected average daily demand and a projected maximum daily demand for the water system. Projected water demand is expressed as total cubic meters of water per day.
Table 3-2-2c divides the projected total water demand into elements and estimates the percentage of demand associated with each element.

Table 3-2-2a. Mannheim Area Current and Projected Population Served

Installation / Facility	Non-resident Military Personnel	Non-resident Military Personnel (5-year projection)	Non-resident Civilian Personnel	Non-resident Civilian Personnel (5-year projection)	Resident Personnel	Resident Personnel (5-year projection)
HB	25	20	643	550	0	0
STE	21	15	71	50	0	0
TB	622	500	172	150	145	100
KK	155	130	132	120	0	0

Table 3-2-2b. Mannheim Area Current and Projected Water Demand

Installation	Demand (m^3/day)	Demand (m^3/day) (5-year projection)
HB	21	20
STE	8	5
TB/KK	146	130

Table 3-2-2c. Mannheim Area Current and Projected Demand Elements

Demand Element	Percent of Total Demand	Percent of Total Demand (5-year projection)
Consumption	2%	2 %
Sanitation	94 %	94 %
Process Water (e.g., Air Conditioning)	0 %	0 %
Landscaping (Irrigation)	4%	4 %

3.2.3 GC Area

3.2.4 GC

Table 3-2-3a presents the projected population (i.e., 5-year future population) to be served by GC. These populations are also identified specific to individual installations/facilities served by the water system and categorized as non-resident military personnel, non-resident civilian personnel, and resident personnel. Populations are expressed as total persons served by the water system.
Table 3-2-3b presents the projected water demand for GC. Projected water demand is expressed in a manner identical to normal water demand, as a projected average daily demand and a projected maximum daily demand for the water system. Projected water demand is expressed as total cubic meters of water per day.
Table 3-2-3c divides the projected total water demand into elements and estimates the percentage of demand associated with each element.

Table 3-2-3a. GC Current and Projected Population Served

Installation / Facility	Non-resident Military Personnel	Non-resident Military Personnel (5-year projection)	Non-resident Civilian Personnel	Non-resident Civilian Personnel (5-year projection)	Resident Personnel	Resident Personnel (5-year projection)
Golf Club	0	0	25	25	0	0

Table 3-2-3b. GC Current and Projected Water Demand

Parameter	Demand (m^3/day)	Demand (m^3/day) (5-year projection)
Normal Daily Demand (based on annual average)	2	2

Table 3-2-3c. GC Current and Projected Demand Elements

Demand Element	Percent of Total Demand	Percent of Total Demand (5-year projection)
Consumption	2 %	2 %
Sanitation	83 %	83 %
Landscaping (Irrigation)	0 %	0 %
Process Water (e.g., Air Conditioning, Filter)	15%	15%

3.2.4 SAR

Table 3-2-4a presents the projected population (i.e., 5-year future population) to be served by SAR. These populations are also identified specific to individual installations/facilities served by the water system and categorized as non-resident military personnel, non-resident civilian personnel, and resident personnel. Populations are expressed as total persons served by the water system.
Table 3-2-4b presents the projected water demand for SAR. Projected water demand is expressed in a manner identical to normal water demand, as a projected average daily demand and a projected maximum daily demand for the water system. Projected water demand is expressed as total cubic meters of water per day.
Table 3-2-4c divides the projected total water demand into elements and estimates the percentage of demand associated with each element.

Table 3-2-4a. SAR Current and Projected Population Served

Installation/ Facility	Non-resident Military Personnel	Non-resident Military Personnel (5-year projection)	Non-resident Civilian Personnel	Non-resident Civilian Personnel (5-year projection)	Resident Personnel	Resident Personnel (5-year projection)
Small Arms Range	19	19	6	6	0	0

Table 3-2-4b. SAR Current and Projected Water Demand

Parameter	Demand (m^3/day)	Demand (m^3/day) (5-year projection)
Normal Daily Demand (based on annual average)	1	1

Table 3-2-4c. SAR Current and Projected Demand Elements

Demand Element	Percent of Total Demand	Percent of Total Demand (5-year projection)
Consumption	2 %	2%
Sanitation	78 %	78 %
Process Water (e.g., Air Conditioning, Filter)	15 %	15 %
Landscaping	5 %	5 %

4.0 HYDRAULIC CAPACITY ANALYSIS

This section presents a hydraulic analysis of potable water systems. This analysis is necessary to highlight existing and projected deficiencies with regard to the hydraulic capacity of potable water systems. The system conditions and deficiencies are documented in the appropriate subsections below. This analysis is conducted by the DPW and includes, at a minimum, the following elements:

Data Collection and Evaluation

- Determine location, length, size (diameter), material, and condition of all lines;
- Determine location, type, and size (capacity) of valves and hydrants;
- Determine location, capacity, and operating elevations (head) of all storage facilities;
- Evaluate operation and specifications of all water treatment components/facilities;
- Evaluate flow at all hydrants through the conduct of fire-flow tests; and
- Interview relevant DPW, O&M Division and Fire Department personnel to evaluate physical condition of system, note any observed deficiencies, and obtain recommendations for system improvements.

Analysis of Water Systems

- Determine design water quantities for the existing and projected (5-year future) scenarios for each water system;
- Conduct hydraulic analysis of each water system to evaluate water availability (i.e., flow, pressure) and storage capacities;
- Document existing water system conditions/deficiencies that relate to hydraulic capacity and develop corrective actions with cost estimates; and
- Document projected (5-year) future water system conditions/deficiencies that relate to hydraulic capacity and develop corrective actions with cost estimates.

Numerous methods are used to conduct the hydraulic analysis of the water systems. These methods range from manual computations (e.g., the Hardy Cross method) to the use of personal computer (PC)-based models. A method that is appropriate to the type of water system (e.g., looped system, branch network) should be used. The USAG-Heidelberg determines the frequency of 10 years with which the hydraulic capacity analysis should be conducted; If mayor changes are conducted to the water distribution system a hydraulic analysis is conducted during construction for the specific area.

4.1 HEIDELBERG AREA

Data collection and evaluation conducted for the hydraulic analysis of Heidelberg Area are documented in several programs and databases as following:

Annual Hydrant Tests with pressure tests within water system
Unidirectional Flush Program
Annual ISR input with ratings for distribution systems, storage tanks and treatment facilities
Sanitary Survey

4.1.1 Existing Conditions/Deficiencies

Existing conditions of each facility within SWH is assessed in ISR as follows:

Installation	distribution system	storage tank
PHV	green	NA
MTV	green	NA
CB	green	NA
NK	green	NA
HH	green	NA
CSC	green	NA
PB	green	NA
KS	green	red

The fire department requests a higher fire flow for NK and PHV.

4.1.2 Projected (5-Year Future) Conditions/Deficiencies

PHV: Some areas in North PHV with a low water demand, do not have an adequate amount of chlorine available in their water.
KS: Change storage tank and equip with treatment facility, chlorination (at this time bottled water is provided)

4.1.3 Scheduled Upgrades/Recommended Corrective Actions

PHV: Second water main pipe with an own treatment facility is requested. Work request No. DEH-4348-7J (1987)
NK: Replace treatment facility. Work request No. DEH-4934-9J (1990) and work request No. DEH-202-7J (1987)
KS: Change storage tank and equip with treatment facility, chlorination (at this time bottled water is provided)

4.2 MANNHEIM AREA

Data collection and evaluation conducted for the hydraulic analysis of Mannheim Area are documented in several programs and databases as following:

Annual Hydrant Tests with pressure tests within water system
Unidirectional Flush Program
Annual ISR input with ratings for distribution systems, storage tanks and treatment facilities
Sanitary Survey

4.2.1 Existing Conditions/Deficiencies

Installation	distribution system	storage tank
TB	green	NA
KK	green	NA
HB	green	NA
SK	green	NA

4.2.2 Projected (5-Year Future) Conditions/Deficiencies

None

4.2.3 Scheduled Upgrades/Recommended Corrective Actions

None

4.3 GC

Data collection and evaluation conducted for the hydraulic analysis of GC Area is documented in several programs and databases as following:

Annual Hydrant Tests with pressure tests within water system
Unidirectional Flush Program
Annual ISR input with ratings for distribution systems, storage tanks and treatment facilities
Sanitary Survey

4.3.1 Existing Conditions/Deficiencies

Installation	distribution system	storage tank
GC	green	NA

4.3.2 Projected (5-Year Future) Conditions/Deficiencies

None

4.3.3 Scheduled Upgrades/Recommended Corrective Actions

None

4.4 SAR

Data collection and evaluation conducted for the hydraulic analysis of Heidelberg Area are documented in several programs and databases as following:

Annual Hydrant Tests with pressure tests within water system
Unidirectional Flush Program
Annual ISR input with ratings for distribution systems, storage tanks and treatment facilities
Sanitary Survey

4.4.1 Existing Conditions/Deficiencies

Installation	distribution system	storage tank
SAR	green	NA

4.4.2 Projected (5-Year Future) Conditions/Deficiencies

None.

4.4.3 Scheduled Upgrades/Recommended Corrective Actions

None

5.0 TREATMENT ANALYSIS

This section presents a treatment analysis of potable water systems. This analysis is necessary to highlight existing and projected deficiencies with regard to the treatment capabilities of potable water systems.

A comprehensive treatment analysis of each potable water system must be conducted and the system conditions and deficiencies documented in the appropriate subsection below. The analysis is conducted from the DPW, O&M Division, Sanitation Branch and includes following elements:

Data Collection and Evaluation

- The data collection and evaluation conducted for the hydraulic analysis will provide the necessary data for the treatment analysis.

Analysis of Water Systems

- Utilize the design water quantities previously determined for the existing and projected (5-year future) scenarios for each water system;
- Conduct treatment analysis of each water system to evaluate the ability of individual treatment components (e.g., chlorination system, fluoridation system, filter systems) to adequately treat the design water quantities;
- Document existing water system conditions/deficiencies as they relate to treatment capabilities and develop corrective actions with cost estimates; and
- Document projected (5-year) future water system conditions/deficiencies as they relate to treatment and develop corrective actions with cost estimates.

Table 5-1 provides an overview of the on-site treatment that is associated with USAG-Heidelberg's potable water systems.

Table 5-1. Potable Water System Treatment Overview

Water System	Installations Served	On-Site Treatment Provided
SWH	PHV,	Chlorination, Fluoridation
	MTV/CB,	Chlorination, Fluoridation
	NK,	Chlorination
	HH,	Chlorination
	CSC,	Chlorination
	PB,	Chlorination
	KS,	Chlorination
MVV	HB,	Chlorination
	STE,	Chlorination
	TB,	Chlorination
	KK	Chlorination
GC	GC	Chlorination, Mn/Fe-Filter
SAR	SAR	Chlorination, Mn/Fe-Filter

5.1 HEIDELBERG AREA

Data collection and evaluation conducted for the treatment analysis of Heidelberg Area are documented on:

monthly water plant inspection sheets for daily operation
daily CUMACS data

and are reviewed during:

Annual ISR input with ratings treatment facilities
Sanitary Survey
Annual Update of WECP
EPAS
CIP

5.1.1 Existing Conditions/Deficiencies

Installation	Treatment facility
PHV	Green
MTV	Green
CB	NA
NK	Yellow
HH	Green
CSC	Yellow
PB	Yellow
KS	NA

5.1.2 Projected (5-Year Future) Conditions/Deficiencies

NK: Interruption of Chlorination.
KS: Implement chlorination (at this time bottled water is provided)
CSC: Interruption of Chlorination
PB: Interruption of Chlorination

5.1.3 Scheduled Upgrades/Recommended Corrective Actions

NK: Replace treatment facility. Work request No. DEH-4934-9J (1990) and work request No. DEH-202-7J (1987)
KS: Equip with treatment facility, chlorination (at this time bottled water is provided)
CSC: Request for treatment facility renovation available
PB: Request for treatment facility renovation available

5.2 MANNHEIM AREA

Data collection and evaluation conducted for the treatment analysis of Mannheim Area are documented on:

monthly water plant inspection sheets for daily operation
daily CUMACS data

and are reviewed during:

Annual ISR input with ratings treatment facilities
Sanitary Survey
Annual Update of WECP
EPAS
CIP

5.2.1 Existing Conditions/Deficiencies

Installation	Treatment facility
TB	Green
KK	NA
HB	Yellow
SK	Yellow

5.2.2 Projected (5-Year Future) Conditions/Deficiencies

HB: Interruption of Chlorination
SK: Interruption of Chlorination

5.2.3 Scheduled Upgrades/Recommended Corrective Actions

HB: Request for treatment facility renovation available
SK: Request for treatment facility renovation available

5.3 GC

Data collection and evaluation conducted for the treatment analysis of GC Area are documented on:

- monthly water plant inspection sheets for daily operation
- CUMACS data

and are reviewed during:

- Annual ISR input with ratings treatment facilities
- Sanitary Survey
- Annual Update of WECP
- EPAS
- CIP

5.3.1 Existing Conditions/Deficiencies

Installation	Treatment facility
GC	Green

5.3.2 Projected (5-Year Future) Conditions/Deficiencies

None

5.3.3 Scheduled Upgrades/Recommended Corrective Actions

None

5.4 SAR

Data collection and evaluation conducted for the treatment analysis of Heidelberg Area are documented on:

- monthly water plant inspection sheets for daily operation
- CUMACS data

and are reviewed during:

- Annual ISR input with ratings treatment facilities
- Sanitary Survey
- Annual Update of WECP
- EPAS
- CIP

5.4.1 Existing Conditions/Deficiencies

Installation	Treatment facility
SAR	Green

5.4.2 Projected (5-Year Future) Conditions/Deficiencies

None

5.4.3 Scheduled Upgrades/Recommended Corrective Actions

None

6.0 POTABLE WATER SYSTEM MAPS

Section 3-3a of the GFGS requires that potable water system maps be maintained current. DPW, O&M Division, with support from DPW, Engineering, Plans, and Services is responsible for maintaining a complete set of current potable water system maps. Copies of current maps for potable water systems are included with this document as Appendix B.

6.1 CONTENT

The content for the potable water system maps and files presented in this subsection reflect the components of the actual potable water systems.

USAG-Heidelberg's potable water system maps contain the following information:

- location, size, type of material, and bury depth of transmission lines;
- location, size, type of material, and bury depth of water distribution lines;
- location, size, and type of valves;
- location of well pumps;
- location, size, and type of hydrants;
- location of water tanks;
- location of flow meters;
- safe yield of on-site wells;

USAG-Heidelberg's contingency plan contains the following information:

- available pressure and flow capacity at connection to water supplier
- other detailed information

Process maps contain the following information:

- single-line drawing of chlorination system (including flow meters, pumps, chemical feed, and type of control and automation);
- single-line drawing of fluoridation system process (including flow meters, pumps, chemical feed, and type of control and automation);
- single-line drawing of other treatment processes;

6.2 REVISION

Potable water system maps are updated manual whenever changes or modifications to the potable water systems are complete by Sanitation Branch. A complete update was done by contractor URS in December 2004.

DPW, O&M Division, Sanitation Branch shall be informed of all projects that result in changes or modifications to our potable water systems. DPW, O&M Division, Sanitation Branch shall be provided with as-built information by the project proponent. Such as-built information shall clearly detail the exact changes or modifications to the affected parts of the potable water system.
With support from DPW, O&M Division, the DPW Engineering Technical Services Division shall ensure that potable water system maps are updated to reflect as-built information

7.0 WATER QUALITY MONITORING PROGRAM

Section 3-5 of the GFGS contains monitoring requirements for USAG-Heidelberg potable water systems. These monitoring requirements must be met, regardless of whether the USAG-Heidelberg produces or purchases water.

This section details the USAG-Heidelberg water quality monitoring program and its implementation. It should be noted that this section does not reiterate the applicable water quality monitoring requirements, as Chapter 3, Drinking Water, of the GFGS is included as Appendix A to this PWSMP/WECP.
DPW, O&M Division, Sanitation Branch has the overall responsibility for ensuring that water quality monitoring is conducted in accordance with the GFGS.

The USAG-Heidelberg is responsible for ensuring that its monitoring records comply with GFGS requirements.
DPW, O&M Division, Sanitation Branch maintains documentation of the monitoring activities and analyses in DPW, Building No. 3962, Sanitation Branch.

7.1 DISINFECTANT RESIDUAL MONITORING

The DPW, O&M Division is responsible for monitoring chlorination system operation for potable water systems equipped with chlorination. This continuous chlorine monitoring includes also documenting daily chemical usage/flow data and conducting water quality testing to determine point-of-entry (POE) and endpoint free available chlorine concentrations.
DPW, O&M Division, Sanitation Branch personnel records daily chemical usage/flow data and chlorine concentrations (POE) on the monthly operating logs. Active monthly operating logs are maintained at the individual chlorination stations and completed logs are maintained by DPW, O&M Division at Campbell Barracks, Building No. 4 CUMACS and DPW, Building No. 3962, Sanitation Branch.

Compliance with routine disinfectant residual monitoring requirements of potable water systems is achieved by coordinating with Preventive Medicine Activity (PMA), Nachrichten Kaserne, Building 3622 to conduct sample collection, and analysis.
PMA monitors disinfectant residuals at multiple tap locations for each water system that is equipped with chlorination. PMA provides a written summary of free available chlorine monitoring data to DPW, O&M Division on a monthly basis.
Disinfectant residual monitoring locations adequately represent the entire water distribution system being monitored, to include distribution system loops, branches, dead-end lines, and peripheral areas. DPW, O&M Division, Sanitation Branch annually coordinates with PMA that selected sampling locations are representative for the distribution system of each potable water system.

7.2 BACTERIOLOGICAL MONITORING

Compliance with routine bacteriological monitoring requirements of USAG-Heidelberg potable water systems is achieved by annual coordinating with Preventive Medicine Activity (PMA) Nachrichten Kaserne, Building 3622 to conduct sample collection, and analysis.
PMA collects the requisite number of bacteriological samples monthly/quarterly from each water system. PMA provides a written summary of bacteriological monitoring data to O&M Division on a monthly basis per e-mail and on an AKO webpage.

In case of bacteriological contamination be identified, PMA provides bacteriological monitoring data to DPW, O&M Division, Sanitation Branch asap of identification. A second bacteriological sample will be taken within 24 hours and data will be provided to DPW, O&M Division, Sanitation Branch again. In case of positive result water source for this area will be shut off and affected water pipes will be disinfected with high-chlorinated water, public will be notified verbal and via Public Notification letter asap. Bottled water will be provided if indicated.

PMA continues taking bacteriological sampling from affected unit until results are negative and keeps DPW informed. DPW then opens valves again and informs public.

Bacteriological sample locations adequately represent water distribution system being monitored, with its' distribution system loops, branches, dead-end lines, and peripheral areas. DPW, O&M Division selects with PMA sampling locations that are representative for the distribution system in each potable water system.

7.3 FLUORIDE MONITORING

DPW, O&M Division is responsible for monitoring fluoridation system operation for 2 AFH potable water systems equipped with fluoridation. Optimum level for fluoride at POE is between 0.6 ppm and 1.5 ppm. This monitoring includes documenting daily chemical usage/flow data and conducting water quality testing to determine point-of-entry (POE) fluoride concentrations. DPW, O&M Division and CUMACS personnel record daily POE fluoride concentrations, chemical usage/flow data on monthly operating logs. Active monthly operating logs are maintained at the individual fluoridation stations and completed logs are maintained by DPW, O&M Division, Building No. 3962, Sanitation Branch.

7.4 INORGANIC CHEMICAL MONITORING

Annual inorganic chemical monitoring of source water to potable water systems is conducted by CHPPM-EUR with support from DPW, O&M Division, Sanitation Branch. CHPPM-EUR conducts analysis of water samples for inorganic chemicals. CHPPM-EUR provides inorganic chemical monitoring data to DPW, O&M Division after each monitoring event. If necessary, CHPPM-EUR also conducts increased (i.e., quarterly) monitoring.

Potable water systems that purchase water from a supplier, may fully or partially satisfy inorganic chemical monitoring requirements by suppliers water quality monitoring. Water supplier records are annually requested and reviewed by the DPW, O&M Division, Sanitation Branch. Additional inorganic chemical monitoring is necessary if water supplier testing does not satisfy the GFGS inorganic chemical monitoring requirements. A narrative detailing water supplier testing is recommended as the lead paragraph to this subsection, if water supplier testing is being used to either fully or partially comply with inorganic chemical monitoring requirements. This narrative should indicate the specific synthetic organic chemicals that are being monitored for by the water supplier, the frequency of such monitoring, the frequency of DPW requests for monitoring results and the location where water supplier testing records are maintained.

7.5 LEAD AND COPPER MONITORING

Lead and copper monitoring of potable water systems is conducted by DPW, O&M Division, Sanitation Branch. The monitoring is conducted at the tap (i.e., faucet, point of delivery to the consumer). CHPPM-EUR provides sample containers for sample collection to us. DPW, O&M Division, Sanitation Branch coordinates the collection of water quality samples for lead and copper. CHPPM-EUR analyzes samples and provides the resultant lead and copper monitoring data to DPW, O&M Division, Sanitation Branch after each monitoring event. DPW informs the public of the results. In case of elevated levels residents are informed by a public notification and devices are replaced with lead free faucets. This program is conducted at each public water system. DPW, O&M Division, Sanitation Branch provides a written report after each sampling event.

7.6 SYNTHETIC ORGANIC CHEMICAL MONITORING

Annual synthetic organic chemical monitoring of potable water systems is conducted by CHPPM-EUR with support from DPW, O&M Division, Sanitation Branch. CHPPM-EUR coordinates analysis of water samples for synthetic organic chemicals. CHPPM-EUR provides synthetic organic chemical monitoring data to DPW, O&M Division, Sanitation Branch after each monitoring event. If necessary, CHPPM-EUR also conducts increased (i.e., quarterly) monitoring.

Potable water systems that purchase water from a supplier may satisfy synthetic organic chemical monitoring requirements by the water suppliers monitoring. Water supplier test records are requested from DPW, O&M Division, Sanitation Branch annually and are reviewed. Additional synthetic organic chemical monitoring is necessary only if water supplier testing does not adequately satisfy the synthetic chemical monitoring requirements contained in the GFGS.

7.7 TOTAL TRIHALOMETHANE MONITORING

Total Trihalomethane (TTHM) monitoring is required for potable water systems equipped with chlorination systems. TTHMs form within the water distribution system after the point of chlorination when available chlorine reacts with organic matter, bromine or iodine ions.
Total THM monitoring is conducted by CHPPM-EUR with support from DPW, O&M Division, Sanitation Branch. DPW, O&M Division, Sanitation Branch coordinates the collection of water quality samples for total THM monitoring. CHPPM-EUR provides total THM analysis and monitoring data to DPW, O&M Division after each monitoring event.

7.8 RADIONUCLIDE MONITORING

Radionuclide monitoring (last in 2003) of the source water to the USAG-Heidelberg is conducted by CHPPM-EUR. Water supplier testing records are requested from DPW, O&M Division and are reviewed. Radionuclide monitoring of the source water is conducted by CHPPM-EUR with support from DPW, O&M Division. DPW, O&M Division, Sanitation Branch coordinates the collection of water quality samples for radionuclide monitoring with CHPPM-EUR. CHPPM-EUR provides analysis and radionuclide monitoring data to DPW, O&M Division, Sanitation Branch after each monitoring event.

7.9 TURBIDITY MONITORING

Turbidity monitoring (annual) of source water is conducted by DPW, O&M Division, Sanitation Branch for potable water systems that purchase water from a supplier, turbidity monitoring is done annually. Turbidity monitoring is also conducted by CHPPM-EUR annually with support from DPW, O&M Division, Sanitation Branch. DPW, O&M Division, Sanitation Branch coordinates the collection and analysis of water quality samples for turbidity monitoring with CHPPM-EUR. CHPPM-EUR provides turbidity monitoring data to DPW, O&M Division, Sanitation Branch after each monitoring event.

7.10 PHYSICAL/CHEMICAL PARAMETER MONITORING

Annual physical/chemical parameter monitoring of source water (i.e., monitoring of water color, odor, temperature, pH, conductivity, and oxidizability) is conducted by CHPPM-EUR with support from DPW, O&M Division, Sanitation Branch. DPW, O&M Division, Sanitation Branch coordinates the collection and analysis of water quality samples for physical/chemical parameter monitoring with CHPPM-EUR. CHPPM-EUR provides physical/chemical parameter monitoring data to DPW, O&M Division, Sanitation Branch after each monitoring event.

7.11 WATER QUALITY PROGRAM RECORD KEEPING

DPW, O&M Division, Sanitation Branch maintains complete records for USAG-Heidelberg's potable water systems.
Section 3-3k of the FGS for Germany requires that water system records be maintained for specific periods of time. DPW, O&M Division, Sanitation Branch keeps following records:

- monthly operating records are maintained for at least 3 years and contain the following data:
  - weekly water distribution system chlorine residual (mg/L);
  - daily flow meter readings (cubic meters);
  - feed rate (ppm) (as applicable);
  - feed rate (ppm) (as applicable);
  - documentation of any scheduled maintenance activities to treatment equipment; and
  - documentation of any emergency repairs to treatment equipment.

- bacteriological monitoring records are maintained for at least 5 years and contain the following data:

- location, date, time of sampling;
- name of individual conducting the sampling;
- date of analysis;
- laboratory and individual responsible for performing analysis;
- analytical method used; and
- analytical result.

- chemical monitoring records are maintained for at least 10 years and contain the following data:
  - location, date, time of sampling;
  - name of individual conducting the sampling;
  - sample identification;
  - date of analysis;
  - laboratory and individual responsible for performing analysis;
  - analytical method used; and
  - analytical result.

Section 3.3.1.13 of the GFGS requires that records of corrective actions taken to correct non-compliance with the GFGS be maintained for a specific period of time. DPW, O&M Division, Sanitation Branch maintain records of corrective actions for at least 3 years.
DPW, O&M Division maintains complete potable water system records at DPW, O&M Division, Building No. 3962, Sanitation Branch.

TABLE 7-1: PHYSICAL PARAMETERS SAMPLING PLAN

Parameter	FGS MCL	Sampling Frequency	Sampling Schedule					Sampling Location (Building #)
			2004	2005	2006	2007	2008	
Turbidity	1 NTU	[1]						SWH, MVV
Color (Spectral Absorption Coefficient)	0.5 m^{-1}	[1]	[1]	[1]	[1]	[1]	[1]	SWH, MVV
Odor (Threshold Value)	2@12°C or 3@25°C	[1]	[1]	[1]	[1]	[1]	[1]	SWH, MVV
Taste	2@12°C or 3@25°C	[1]	[1]	[1]	[1]	[1]	[1]	SWH, MVV
Conductivity	2 mS/cm	[1]	[1]	[1]	[1]	[1]	[1]	SWH, MVV
Oxidizability (as O_2)	5 mg/L	[1]	[1]	[1]	[1]	[1]	[1]	SWH, MVV
Temperature	25°C±1°C	Continuous[1]	Continuous					SWH, MVV
PH	>6.5and<9.5	Weekly[2,1]	Weekly					SWH, MVV

[1] monitoring is required every 15,000 m³/year. Pending on area. At MVV, SWH at their wells.

[2]If more than 1000 m³/year, weekly monitoring is required for this parameter.

TABLE 7-2: MICROBIOLOGICAL AND CHLORINE RESIDUAL SAMPLING PLAN

Parameter	FGS MCL	Sampling Frequency	Sampling Schedule					Possible Sampling Location including Recommended Additional Monitoring (Building #)
			2004	2005	2006	2007	2008	
Microbiological	1 positive sample/ month	Monthly	Monthly					**See attached plan**
Chlorine Residual After Disinfection	>0.2 mg/L and <4.0 mg/L	Permanent	Permanent					Chlorine plants (see tables 2-1b-2-4b)
Chlorine Residual within Distribution Net	detectable (not to exceed 4.0 mg/L)	Weekly	Weekly					3962, 3701, 31, 3613, 4455, 4302, 1004, 969, 201, 4101, 4131.

BACTERIOLOGICAL MONITORING WORKSHEET (prepared June 2005)

Supplier/Source	Area Supplied/ Location	Water Treatment by US Forces	Population	1st Week Sample Location	2nd Week Sample Location	3rd Week Sample Location	4th Week Sample Location
SWH	CSC	x	677	Bldg 3962	-	-	-
SWH	PB	x	1164	Bldg 157	-	Bldg 115	-
SWH	HH*	x	87	Bldg 201	-	-	-
SWH	PHV	x	4499	Bldg 4739, 4544	Bldg 4507	Bldg 4499	Bldg 4544
SWH	MTV	x	2859	Bldg 3659	Bldg 3710	Bldg 701	
SWH	CB	x	2933	18	31	7	
SWH	NK	x	1074	Bldg 3607	-	Bldg 3624	-
MVV	TB/KK	x	1226	Bldg 4222	-	Bldg 4312	-
MVV	ST*	x	92	Bldg 1004	-		-
MVV	HB*	x	668	Bldg 969	-		-
GC	GC*	x	75	Bldg 4101	-	-	-
SAR	SAR*	x	75	Bldg 4131	-		-
SWH	*KS **	x	3	Bldg 3585	Bldg 3580		
SWG	GAD	x	800	Bldg 7829	Bldg 7878		

* Quarterly
**Chlorination starts in November 2005

TABLE 7-3: INORGANIC PARAMETERS SAMPLING PLAN

Parameter	FGS MCL	Sampling Frequency	Sampling Schedule					Sampling Location (Building #)
			2005	2006	2007	2008	2009	
Aluminum	0.2 mg/L	Not required[1]	X					[3]
Ammonium (NH_4)	0.5 mg/L	Not required[1]	X					[3]
Antimony	0.006 mg/L	Not required[1]	X					[3]
Arsenic	0.01 mg/L	Annually	X	X	X	X	X	[3]
Asbestos	$7x10^6$ fibers/L	Every 9 years[2]			X			[3]
Barium	1 mg/L	Annually	X	X	X	X	X	[3]
Beryllium	0.004 mg/L	Annually	X	X	X	X	X	[3]
Boron	1 mg/L	Not required[1]	X	X				[3]
Cadmium	0.005 mg/L	Annually	X	X	X	X	X	[3]
Calcium	400 mg/L	Not required[1]	X					[3]
Chloride	250 mg/L	Not required[1]	X					[3]
Chromium	0.05 mg/L	Annually	X	X	X	X	X	[3]
Copper	1.3 mg/L	Annually	X	X	X	X	X	[3]
Cyanide	0.05 mg/L	Annually	X	X	X	X	X	[3]
Fluoride	1.5 mg/L	Annually	X	X	X	X	X	[3]
Iron	0.2 mg/L	Not required[1]	X	X				[3]
Kjeldahl Nitrogen	1 mg/L	Not required[1]	X					[3]
Lead	0.04 mg/L	Annually	X	X	X	X	X	[3]
Magnesium	50 mg/L	Not required[1]	X					[3]
Manganese	0.05 mg/L	Not required[1]	X					[3]
Mercury	0.001 mg/L	Annually	X	X	X	X	X	[3]
Nickel	0.05 mg/L	Annually	X	X	X	X	X	[3]

Parameter	FGS MCL	Sampling Frequency	Sampling Schedule					Sampling Location (Building #)
			2005	2006	2007	2008	2009	
Nitrate (as N)	10 mg/L	Annually	X	X	X	X	X	[3]
Nitrite (as N)	0.03 mg/L	Annually	X	X	X	X	X	[3]
Nitrate and Nitrite Total (as N)	10 mg/L	Annually	X	X	X	X	X	[3]
Phosphorus (as PO_4)	6.7 mg/L	Not required[1]	X					[3]
Potassium	12 mg/L	Not required[1]	X					[3]
Selenium	0.01 mg/L	Annually	X	X	X	X	X	[3]
Silver	0.01 mg/L	Annually	X	X	X	X	X	[3]
Sodium	150 mg/L	Annually	X	X	X	X	X	[3]
Sulfate (as SO_4)	240 mg/L	Not required[1]	X					[3]
Surfactants (anionic and non-ionic)	0.2 mg/L	Annually	X	X	X	X	X	[3]
Thallium	0.002 mg/L	Annually	X	X	X	X	X	[3]
Zinc	5 mg/L	Annually	X	X	X	X	X	[3]

[1] Sample for these chemicals only upon direction of the medical authority: When sampled, these MCLs apply.

[2] Monitoring for asbestos was last conducted in 1997.

[3] Varying Buildings.One sample per water supplier area for MVV, SWH, and at buildings 3538, 4103, 4136

TABLE 7-4: SYNTHETIC ORGANIC PARAMETERS SAMPLING PLAN

Parameter	FGS MCL	Sampling Frequency	Sampling Schedule					Sampling Location (Building #)
			2005	2006	2007	2008	2009	
Benzene	0.005 mg/L	Triennial[1]		X				[6]
Carbon tetrachloride	0.003 mg/L	Triennial[1]		X				[6]
o-Dichlorobenzene	0.6 mg/L	Triennial[1]		X				[6]
cis-1,2-Dichloroethylene	0.07 mg/L	Triennial[1]		X				[6]
trans-1,2-Dichloroethylene	0.1 mg/L	Triennial[1]		X				[6]
1,1-Dichloroethylene	0.007 mg/L	Triennial[1]		X				[6]
1,2,4-Trichlorobenzene	0.07 mg/L	Triennial[1]		X				[6]
1,1,1-Trichloroethane	0.01 mg/L	Triennial[1]		X				[6]
1,1,2-Trichloroethane	0.005 mg/L	Triennial[1]		X				[6]
1,2-Dichloroethane	0.005 mg/L	Triennial[1]		X				[6]
Dichloromethane	0.01 mg/L	Triennial[1]		X				[6]
1,2-Dichloropropane	0.005 mg/L	Triennial[1]		X				[6]
Ethylbenzene	0.7 mg/L	Triennial[1]		X				[6]
Monochlorobenzene	0.1 mg/L	Triennial[1]		X				[6]
para-Dichlorobenzene	0.075 mg/L	Triennial[1]		X				[6]
Styrene	0.1 mg/L	Triennial[1]		X				[6]
Tetrachloroethylene	0.005 mg/L	Triennial[1]		X				[6]
Trichloroethylene	0.005 mg/L	Triennial[1]		X				[6]
Toluene	1 mg/L	Triennial[1]		X				[6]
Vinyl chloride	0.002 mg/L	Triennial[1]		X				[6]
Xylene (Total)	10 mg/L	Triennial[1]		X				[6]
Organic chlorinated compounds (Total):	0,01	Triennial[1]		X				[6]
Dichloromethane								[6]
1,1,1-Trichloroethane								[6]

Parameter	FGS MCL	Sampling Frequency	Sampling Schedule					Sampling Location (Building #)
			2005	2006	2007	2008	2009	
Tetrachloroethylene								[6]
Trichloroethylene								[6]
Polycyclic aromatic hydrocarbons (Total):	0.0002 mg/L	Annually	X	X	X	X	X	[6]
Fluoranthene								[6]
Benzo-(b)-Fluoranthene								[6]
Benzo-(k)-Fluoranthene								[6]
Benzo-(a)-Pyrene								[6]
Benzo-(ghi)-Perylene								[6]
Indeno-(1,2,3-cd)-Pyrene								[6]
Total trihalomethanes	0,01	Annually	X	X	X	X	X	[6]
Phenol	0.0005 mg/L	Not required[2]						[6]
Total Petroleum Hydrocarbons	0.01 mg/L	Not required[2]						[6]
Acrylamide	Treatment Technique	Not required[3]						[6]
Epihydrochlorin	Treatment Technique	Not required[3]						[6]
Pesticides (as single substance)	0.0001 mg/L	Triennial[4]		X				[6]
Total pesticides	0.0005 mg/L	Triennial[4]		X				[6]
Polychlorinated, polybrominated biphenyls and terphenyls considered separately (PCB/Ts)	0.0001 mg/L	Triennial[5]		X				[6]
PCB/Ts (Total)	0.0005 mg/L	Triennial[5]		X				[6]

[1] Annual sampling was conducted for this parameter from 1998-2003.

[2] Appropriate DoD Medical Authorities have not directed the USAG-Heidelberg to sample for this parameter.

[3] Currently, the USAG-Heidelberg does not use this chemical in the treatment process.

[4] Monitoring for pesticides was last conducted in 2003.

[5] Monitoring for total PCB/Ts was last conducted in 2003.

[6] Varying Buildings. One sample per water supplier area for MVV, SWH, and at buildings 3538, 4103, 4136

TABLE 7-5 RADIONUCLIDES SAMPLING PLAN

Parameter	FGS MCL	Sampling Frequency	Sampling Schedule					Sampling Location (Building #)
			2005	2006	2007	2008	2009	
Gross Alpha	15 pCi/L	every 4 years, 4 consecutive quarterly samples[1]			X			[3]
Combined Radium-226 and -228 [2]	5 pCi/L	every 4 years, 4 consecutive quarterly samples[1]				X		[3]
Gross Beta	50 pCi/L	Not required[3]						[3]

[1] Monitoring for gross alpha was last conducted in 2003.

[2] Sampling for combined Radium-226 and -228 has not been conducted.

[3] Varying Buildings. One sample per water supplier area for MVV, SWH, and at buildings 3538, 4103, 4136

8.0 CROSS CONNECTION CONTROL AND BACKFLOW PREVENTION PROGRAM

This section presents the cross connection control and backflow prevention program in accordance with Section 3.3.1.8 of the GFGS.

An effective cross connection control and backflow prevention program is established to ensure that the potable water distribution system is not connected to any non-potable water systems. A cross connection is an arrangement of piping that allows the potable water supply line to be connected to a line that contains a contaminant. The most common type of cross connection is a garden hose not equipped with a backflow prevention device that is connected to the potable water supply system. This hose can readily be connected to pesticide/herbicide application equipment, be submerged in a tub full of detergent, or be lying in a cesspool. Other examples of cross connection include supply lines connected to bottom-fed tanks and supply lines connected to boilers. Cross connections are activated when backflow conditions occur. Two types of backflow can occur, back pressure and backsiphonage. Backpressure occurs when the pressure at a point of use exceeds the supply pressure. Backsiphonage can occur when atmospheric pressure exceeds supply pressure. Backpressure can occur in hot water boiler heating systems, elevated tanks, and other pressure-producing systems. Backsiphonage can occur during water main breaks and fire demands when the distribution system pressure is lowered and the minimum operating pressures are not maintained.

The USAG-Heidelberg's cross connection and backflow prevention program started in 2004. The program:

- identifies the backflow prevention devices necessary to protect potable water in both the water distribution system mains and within individual buildings;
- prioritizes facilities where the application of cross connection control and backflow prevention is essential;
- establishes operation and maintenance practices to protect potable water throughout the water distribution system; and
- assigns responsibilities for program implementation.

8.1 PROTECTION DEVICES

Standard plumbing devices are available to minimize the potential for cross connection or backflow. At a minimum, the following two criteria are considered when selecting a backflow prevention device:

- degree of hazard; and
- type of backflow likely to occur (i.e., backpressure or backsiphonage).

The degree of hazard criteria is based strictly on the potential contamination and is defined as follows:

- High Hazard. Potential contamination poses a human health hazard;
- Moderate Hazard. Potential contamination is highly objectionable but does not pose a human health hazard; and
- Low Hazard. Potential contamination is aesthetically objectionable or presents a nuisance but does not pose a human health hazard.

Table 8-1 lists common prevention devices and the type of backflow and degree of hazard for which the devices are appropriate.
Backflow prevention devices are installed in accordance with the following good management practices:

- backflow prevention devices are installed only in accessible locations;
- backflow prevention devices shall be not be installed in pits or similar locations with the potential for the device to be submerged;

- atmospheric vacuum breakers shall be installed with the critical level at least 15 centimeters (six inches) above the flood level rim or highest point of discharge of the fixture being served; such devices shall be installed on the discharge side of the last control valve to the fixture and no shut off valve or faucet shall be installed downstream of the vacuum breaker;
- pressure type vacuum breakers shall be installed at a height of at least 30 centimeters (12 inches) above the flood level rim of the fixture tank or similar device; and
- double check valves and reduced pressure principle valves are installed at least 30 centimeters (12 inches) above the floor.

Backflow prevention devices installed IAW DIN 1988 and EN1717 or DIN/DVGW approved iaw German requirements. A full list of approved devices and suppliers can be obtained through the DVGW (Deutscher Verein des Gas- und Wasserfaches e.V. - Technisch Wissenschaftliche Vereinigung, Josef-Wirmar-Str. 1-3, 53123 Bonn). The location and type of backflow prevention devices and their application are described in the German standard DIN 1988 (Part 4). The specifications of the appurtenances are described in DIN 3266 (Part 1), DIN 3269 (Part 1), and DIN 3211 (Part 1).

Table 8-1. Backflow Prevention Devices

Common Name	Appropriate Backflow Condition	Degree of Hazard	Testable While Operational	Commonly Available Sizes (cm)	Remarks/Comments
Reduced pressure backflow prevention device.	Backpressure, Backsiphonage	Low, Moderate, High	Yes	2.0 to 25	One of the best overall backflow prevention devices currently available.
Air gap.	Backpressure, Backsiphonage	Low, Moderate, High	Not Applicable	Not Applicable	Excellent backflow prevention, subject to tampering or easy circumvention.
Double-check valve assembly.	Backpressure, Backsiphonage	Low, Moderate	Yes	2.0 to 25	Should be installed a minimum of 12 inches above ground or flood level.
Pressure vacuum breaker or anti-siphon vacuum breaker, pressure type.	Backsiphonage	Low, Moderate, High	Yes	1.5 to 25	May be installed under continuous pressure, i.e., valves permitted downstream of device.
Atmospheric vacuum breaker or anti-siphon vacuum breaker, non-continuous type.	Backsiphonage	Low, Moderate	Yes (Visual)	0.5 to 3.0	May not be installed under continuous pressure.

Table 8-2. POE water main back flow prevention devices

Installation	Manufacture	Diameter	Length
PHV	Braukmann	DN200	500 mm
MTV north/south	Braukmann	DN200/DN150	500 mm/400 mm

NK	Braukmann	DN250	600 mm
PB	Braukmann	DN150	400 mm
CSC	Braukmann	DN150	400 mm
AF	Braukmann	DN150	400 mm
KS	not known	DN50	150 mm
HB	Braukmann	DN80/DN80	150 mm/150 mm
TB and KK	Braukmann	DN150	400 mm
ST	Braukmann	DN100	300 mm
GC	Braukmann	DN150/DN100	400 mm/300 mm
SAR	Braukmann	DN80/DN80	150 mm/150 mm

Table 8-3 Overflow Pipe Sizes for Storage Tanks and Basins

Maximum Capacity of Water Supply Line to Storage Tank/Basin (liters/minute)	Minimum Inner-Diameter of Overflow Pipe (millimeters)
0 to 49	40
50 to 208	50
209 to 379	65
380 to 625	80
626 to 1344	100
1345 to 2422	125
2423 to 3936	150
Greater than 3936	200

8.2 PRIORITY APPLICATIONS

The following locations are considered to be high-hazard locations, and thus backflow prevention devices are installed to prevent the threat of contamination to potable water systems:

- Storage Tanks and Basins Containing Hazardous Substances. Potable water supply lines that terminate below the rim of the tank/basin with an overflow pipe with a diameter not less than that listed in Table 8-2 do have an air gap on the overflow pipe as close to the tank as possible and the potable water outlet terminates at a height not less than 1.5 times the height to which water can rise in the tank/basin above the top of the overflow pipe. This high-water level is established at the maximum flow rate of potable water to the tank/basin and with all outlets closed except the air-gapped overflow outlet. The height of the potable water supply outlet relative to the high-water level is measured from the critical point of the potable water supply outlet. The critical point is either the lowest invert of the outlet or if a backflow prevention device is installed on the potable water supply line, the manufacturer's critical point for the device.

- Cooling Towers and Boiler Water Treatment Facilities Potable water supply lines serving chemical treatment equipment (e.g., cooling tower and boiler water treatment equipment) have backflow prevention devices installed to prevent the contamination of potable

water within the supply lines. Check valves are not acceptable devices. Continuous pressure backflow prevention devices are preferred.

- Pest Management Facilities. Potable water supply lines that provide a source of water for filling pesticide mixing basins, containers, or dispersion equipment. Hose is fixed rigid (special device see manual) about 40 cm higher than the containers (barrel) height, so that it is not touching container and cannot touch the surface of the water mixture. If other devices are used in future it shall be fitted with a backflow prevention device. Reduced pressure backflow prevention devices are preferential. This will allow for a hose to be fitted to a faucet and used for filling basins, containers, or equipment (hose does not touch chemical tank).

- Dining Facilities. Potable water supply lines serving dining facilities are fitted with backflow prevention devices, or an air gap (of at least two pipe diameters).

- Swimming Pool Circulation Systems. Potable water supply lines that serve a swimming pool and auxiliary facilities shall be protected against backflow. An air gap shall be applied at locations where potable water is introduced directly into a swimming pool or a circulation system. *Not applicable at USAG Heidelberg*

- Irrigation and Sprinkler Systems. Potable water systems lines that serve an irrigation/sprinkler system are all fitted with an atmospheric vacuum breaker. Single or multiple check valves are not acceptable backflow prevention devices for this application (Rohrtrenner). Sprinkler systems are located in the following buildings: NK 3610, 3628, 3613, MTV 3654, 3797, 3744, 3733, 3735, 3796, PHV 4442, 4443, 4539, 4507, PB 103, 112, 114, 156, TB 4289, 4391, KK 4308,CB 7, 12M, CSC 3850.

- Aqueous Film Forming Foam (AFFF) Fire Suppression Systems All Kitchen fire suppression systems (Fa. Ansul and Fa. Guardian) are not connected to the water supply lines. The systems work with CO_2-cartridges not with water. Potable water lines that serve equipment/systems containing chemicals such as AFFF shall be fitted with reduced pressure backflow prevention devices. Potable water lines that serve foam-water sprinkler systems shall be fitted with reduced pressure backflow prevention devices installed inside the fire protection room. *Not applicable at USAG-Heidelberg Installations.*

- Water-Alcohol Dispensing Systems for Aircraft. Some jet engine aircraft require an injection of a water and methyl alcohol mixture for power augmentation at takeoff. Some piston engine aircraft require a different blend of water and methyl alcohol. These facilities/equipment typically consist of a pump house, a storage tank for methyl alcohol, and a storage/mixing tank for blending the water and methyl alcohol. Potable water supply lines that serve the storage/mixing tank shall have a break applied between the water supply lines and the water fill stem to prevent backflow of the water-alcohol blend into the supply lines. *Not applicable at USAG-Heidelberg Installations.*

- Fire Engine Suppression Systems. (F&ES) Potable water lines that serve fire engine suppression systems shall be fitted with backflow prevention devices. Potable water lines that serve equipment/systems containing chemicals such as AFFF shall be fitted with reduced pressure backflow prevention devices.

The following facilities are additional high-hazard locations where backflow prevention devices are installed:

- Hospital and Medical Facilities

- Medical Laboratories
- Subsurface Irrigation Systems
- Toilets and Urinals
- Laundry and Dyeing Facilities
- Film Processing Facilities

Typical low hazard or non-hazardous locations that require backflow prevention devices in accordance with German requirements include:

- Bathtubs and showers with a hose in housing facilities and hotels (at minimum, a combined backflow preventer and simple vacuum breaker is required).
- Bathtubs and showers with an intake below the maximum possible water level in housing facilities and hotels.
- Above ground irrigating systems (at minimum, a combined backflow preventer and atmospheric vacuum breaker is required).
- Washing machines and dishwashers.
- Garden faucets and faucets with hose connections (at minimum, a combined backflow preventer and simple atmospheric vacuum breaker is required).

8.3 OPERATION AND MAINTENANCE PRACTICES

Maintaining a continuous positive pressure in the distribution system minimizes backsiphonage from service lines. The following operation and maintenance practices are implemented to minimize the potential for backsiphonage:

- maintaining minimum operating pressures (10 psi minimum, tested from F&ES) during peak and fire flow demands;
- maintaining sufficient water storage to ensure adequate water flow during peak and fire demands. Water flow during peaks is guaranteed.
- maintaining sufficiently sized water mains to minimize pressure head loss.
- flushing water distribution system mains (in accordance with Section 9.0 of this PWSMP) to maintain the hydraulic capacity of the potable water systems is done annually. Reports are kept at DPW, O&M Division, Sanitation Section and at the Fire and Emergency Services Branch.
- maintaining valves to ensure that valves are not “frozen” when water main breaks or maintenance activities require isolation of a section.
- evaluating the hydraulic capacity of the potable water systems to identify deficiencies that require corrective actions.

Leaking pipe joints can lead to contamination of the potable water being distributed through the water system. Under certain conditions, contaminated groundwater can enter a leaking subsurface water distribution main under natural hydrostatic pressure. The following operation and maintenance practices are implemented to minimize the potential for this contamination:

- disinfectant residual throughout the distribution system in accordance with the GFGS is maintained. In areas without chlorination, bottled water is provided (KS)
- inspecting the condition of subsurface pipes and joints during maintenance or construction of service line connections; is done by DPW, O&M Division, Sanitation Branch.
- conducting pressure testing of water distribution main during annual FES hydrant tests. Sections where leaking is suspected, water demands are reviewed daily, so that hidden water leaks can be identified, selected and repaired.

Additional good management practices are implemented to minimize the potential for cross connection or backflow. These include:

- Water mains are not located in, under, or above cesspools, septic tanks, septic tank drainage fields, or drainage pits.
- A separation of 10 feet (3 meters) is maintained between water mains and cesspools, septic tanks, septic tank drainage fields, or drainage pits. (See maps)
- Whenever a water distribution main is close to a sanitary sewer line, a minimum clearance of 12 inches (30 centimeters) is maintained between the outside walls of the pipes. (See maps)

Ground and elevated storage tanks are potential sources of non-potable water if the storage tanks are not designed or operated properly. Storage tanks typically vent to the atmosphere, and if the vent is not properly screened, vermin can enter the tank, leave their excrement or drown. If the storage tanks are allowed to stagnate, bacteria and other microorganisms can enter the vents and begin culturing as the disinfectant residual dissipates. The following operation and maintenance practices are implemented to minimize the potential for contamination of water in storage tanks:

- maintaining a detectable disinfectant residual in the storage high pressure tank is measured by DPW;
- maintaining the storage high pressure tanks interior in a sanitary condition, the tanks are stainless steal not painted; last Tüv Inspection was in 2000, next Tüv Inspection is scheduled for 2005.
- periodically checking the condition of vents n/a and screening, man ways, drains and overflow piping; included in last Tüv Inspection in 2000, next Tüv Inspection is scheduled for 2005. compressor is equipped with air filter
- periodically checking the condition of paint or other protective coatings including the protection of steel from corrosion n/a
- periodically checking the condition of water level controls (e.g., level gauges, pressure switches). Continuous water level control by CUMACS.
-

8.4 RESPONSIBILITIES FOR PROGRAM IMPLEMENTATION

The DPW, O&M Division, Sanitation Branch is responsible for maintaining and updating the PWSMP annually and Sanitation Branch and Mechanical Branch implement the cross connection control and backflow prevention program. These responsibilities include:

- reviewing plans and specifications for new construction to ensure conformance with program requirements regarding water main construction and the installation of backflow prevention devices.

- reviewing plans and specifications for facility and potable water system renovations to ensure conformance with program requirements regarding water main construction and the installation of backflow prevention devices; and

- operating and maintaining water storage tanks, distribution mains, and protection devices to minimize backflow conditions and prevent unnecessary cross connections.

9.0 ANNUAL UNIDIRECTIONAL WATER MAIN FLUSHING PROGRAM

This section presents the USAG-Heidelberg's annual water main flushing program. Section 3.3.1.7.3 of the GFGS requires having an effective annual unidirectional water main flushing program (see table 9-1). Sanitation Branch developed a unidirectional flush plan for each installation of USAG-Heidelberg that is followed step by step during period of water main flushing.

Annual water main flushing is conducted to remove deposits of loose solid material, rust or organic matter that may settle during low-flow conditions in the water distribution system, especially in dead-end branches of the potable water systems. These deposits, if not removed, encourage bacterial growth within the distribution system.

Table 9-1. Annual Unidirectional Water Main Flushing

No.	Area	FES Hydr.Nr.	Water Dist.Plan Hydr. Nr.	Flush min	open valve	shut valve
1	Airfield Field	7	AE 97	5		IAE 111
2	Airfield Field	4	AE 117	5	IAE 111	IAE 108
3	Airfield Field	1	AE 131	5	IAE 108	
4	Campbell Bks	1	AE 621	10		IAE 619 ; IAE 992
5	Campbell Bks	2	AE 695	10		
6	Campbell Bks	3	AE 699	10		
7	Campbell Bks	4	AE 715	10		
8	Campbell Bks	10	AE 730	10		
9	Campbell Bks	8	AE 780	10		
10	Campbell Bks	6	AE 767	10		Schieber links daneben
11	Campbell Bks	7	AE 751	10		s.o.
12	Campbell Bks	9	keine Nr.vergeben	10	Schieber links daneben	
13	Campbell Bks	5	AE 638?641?	5	IAE 619; IAE 992	
14	Com.Sup.Cent.	3		10		
15	Com.Sup.Cent.	2		5		
16	Com.Sup.Cent.	1		5		
17	Com.Sup.Cent.	4		10		
18	Com.Sup.Cent.	5		5		
19	Com.Sup.Cent.	11	AE 206	5		
20	Com.Sup.Cent.	7	AE 239	10		
21	Com.Sup.Cent.	9	AE 311	10		
22	Com.Sup.Cent.	6	AE 242	10		nach CSC No.6/AE 242
23	Com.Sup.Cent.	8	AE 262	5		
24	Com.Sup.Cent.	10	?	5		
25	Com.Sup.Cent.	12	AE 245	5		
26	Com.Sup.Cent.	14	AE188	5		
27	Com.Sup.Cent.	15	keine Nr.	15	nach CSC No.6/AE 244	IAE 184
	Com.Sup.Cent.				IAE 184	
28	Golf course	1	AE1098	10		
29	Golf course	2	AE1120	10		
30	Hammonds	2	keine Nr.	15		

No.	Area	FES Hydr.Nr.	Water Dist.Plan Hydr. Nr.	Flush min	open valve	shut valve
31	Hammonds	3	keine Nr.	15		
32	Hammonds	1	keine Nr.	5		IAE 977
33	Hammonds	6	keine Nr.	15		
34	Hammonds	5	keine Nr.	5		
35	Hammonds	4	keine Nr.	5		
36	Hammonds	nochmals 3	keine Nr.	10		
	Hammonds				IAE 977	
37	Hospital	5	FH 2	10		IAE 826
38	Hospital	6	FH 3	5		
39	Hospital	8	FH 4	10		
40	Hospital	7	AE 1288	10		
41	Hospital	4	AE 958	10		IAE 904
42	Hospital	3	FH 7	10		
43	Hospital	2	FH 8	10		
44	Hospital	1	FH 1	10		
	Hospital				IAE 826, IAE 904	
45	Patton	16	AE 468	5		IAE 411
46	Patton	14	AE 465	5		
47	Patton	15	AE 471	5		
48	Patton	10	AE 437	5		
49	Patton	7	AE 456	5		
50	Patton	11	AE 458	5		
51	Patton	8	AE 452	5		
52	Patton	18	AE 479	5		
53	Patton	17	AE 480	10		
54	Patton	12	bei Geb.113, AE 450	10		
55	Patton	9	AE 453	10		
56	Patton	6	keine	10		
57	Patton	ohne Nr.	AE 1614; FH11 Baseballfield			
58	Patton	5	AE 438	10		
59	Patton	2	AE 430	10		
60	Patton	4	AE 439	10		
61	Patton	3	AE 429	10		
62	Patton	1	AE 426	10		
63	Patton	13	AE 466	10		
	Patton				IAE 411	
64	Tompkins	19	AE 1263	5		
65	Tompkins	18	AE 1260	5		
66	Tompkins	15	AE 1257;FH 5	5		
67	Tompkins	14	ohne Nr.	5		
68	Tompkins	16	FH 7	5		

No.	Area	FES Hydr.Nr.	Water Dist.Plan Hydr. Nr.	Flush min	open valve	shut valve
69	Tompkins	17	FH 6	5		
70	Tompkins	8	AE 1200	10		ohne Nr.???
71	Tompkins		FH 3	5		
72	Tompkins	5	AE 1183	10		
73	Tompkins	1	FH 1	10		
74	Tompkins	2	FH 13	10		AE 1538
75	Tompkins	3	FH 12	10		
76	Tompkins	4	AE 1273	10	AE 1538	AE 1194
77	Tompkins	6	AE 1276	10		
		7				
78	Tompkins	7 nochmals	AE 1283 A	10	AE 1194	
79	Tompkins	13	keine Nr.	15		
80	Tompkins	9	FH 11	15		
81	Kilbourne	ohne Nr. Links vom Zaun	ohne Nr.	10		Tompkins AE 1535; Tompkins AE 1538
82	Kilbourne	1	ohne Nr.	20		
83	Kilbourne	2	AE 336	5		
84	Kilbourne	3	AE 357	5		IAE 349
85	Kilbourne	4	AE 367	5		IAE 345
86	Kilbourne	5	ohne Nr.	5		
87	Kilbourne	6	ohne Nr.	5	AE 349	AE 348
88	Kilbourne	7	ohne Nr.	10		Schieberkreuz, Schieber Richtung 4306
89	Kilbourne	8	ohne Nr.	10	Schieberkreuz, Schieber Richtung 4306	
90	Kilbourne	8	ohne Nr.	10	AE 349	
	Kilbourne					
91	MTV Sued	16	AE 1154	10		
92	MTV	14	AE 1013	5		
93	MTV	13	AE 905	5		
94	MTV	11	AE 1025	5		
95	MTV	7	ohne Nr.	5		
96	MTV	8	AE 1034	5		
97	MTV	6	ohne Nr.	10		IAE 1043
98	MTV	10	AE 1094	5		
99	MTV	12	AE 1046	10		
100	MTV	9 wo Anschluss?	ohne Nr.	10	IAE 1043	IAE 1041
101	MTV	4	AE 1060	15		IAE 1092
102	MTV	5	AE 1066	5		
103	MTV	3	AE 1074	5		

Nr.	Area	FES Hydr.Nr.	Water Dist.Plan Hydr. Nr.	Flush min	Schieber aufdrehen	Schieber zudrehen
104	MTV	1	AE 1081	5		
105	MTV	2	AE 1091	5		
106	MTV	nochmals 2	AE 1091	10	IAE 1092	IAE 1070
107	MTV	nochmals 5	AE 1066	10	IAE 725 Campbell B.	IAE 1067
108	MTV Nord	33	AE 1417	15		IAE 3275
109	MTV	36	AE 1399	10		
110	MTV	35	AE 679	10		
111	MTV	nochmals 36	AE1399	10		IAE 1404; IAE 1406
112	MTV	34	FH 5 Plan2	10		
113	MTV	nochmals 34	FH 5 Plan2	5	IAE 1406	
114	MTV	31	AE 1373	15	IAE 1404	
115	MTV	28	AE 1357	15		IAE 3275
116	MTV	30	AE 1338	10		
117	MTV	29	AE 1324	10		
118	MTV	26	AE 1300	15		
119	MTV	25	AE 1291	10		
120	MTV	24	AE 1258	10	IAE 3275	im Schacht bei Geb. 3727
121	MTV	23	AE 1245	5		IAE 1260
122	MTV	22	AE 1126	5	IAE 1260	
123	MTV	21	AE 1139	10		
124	MTV	20	AE 1144A	5		
125	MTV	18	ohne Nr.	5		
126	MTV	nochmals 16	AE 1154	15	Schieber vor Geb.3736	Schieber an Chlorstation: IAE 1043; IAE 1008
127	MTV	19	AE 1113	10	IAE 1098(sonst immer zu)	Schieber vor Geb.3736
128	MTV	17	AE 1108	10		
129	MTV	nochmals 16	AE 1154	10	IAE 1043; IAE 1008	
130	MTV					IAE 1098(sonst immer zu)
131	PHV	87	AE 2811	10		
132	PHV	86	AE 2822	10		IAE 2813
133	PHV	85	keine Nr.	10		IAE 3177
134	PHV	84	AE 3179	10		
135	PHV	83	AE 3184	10		IAE 3188
136	PHV	ohne Nr.;Geb.4703/04	AE 3297	10		IAE 3247;IAE3218
137	PHV	75	AE 3281	10		
138	PHV	74	AE 3272	10		

Nr.	Area	FES Hydr.Nr.	Water Dist.Plan Hydr. Nr.	Flush min	Schieber aufdrehen	Schieber zudrehen
139	PHV	73	AE 3267	10		
140	PHV	72	AE 3259	10		
141	PHV	71	AE 3251	10		
142	PHV	68	AE 3216	10	IAE 3218	IAE 3168; IAE 3157
143	PHV	67	AE 3159	10		
144	PHV	65	AE 3163	10		
145	PHV	69	AE 3207	10		
146	PHV	66	AE 3151	10	IAE 3157	IAE 3218
147	PHV	70	ohne Nr.	15		
148	PHV	78	ohne Nr.	10		
149	PHV	77	AE 3243	10		
150	PHV	76	ohne Nr.	10	IAE 3188;IAE 3247;IAE 3218	es bleiben zu:IAE 2813;3177;3168
151	PHV	82	AE 3190	5		IAE 3168
152	PHV	81	AE 3194	5		
153	PHV	80	AE 3198	10		
154	PHV	79	ohne Nr.	10		
155	PHV	88	AE 3174	10		
156	PHV	89	AE 3175	10		
157	PHV	nochmals 89	AE 3175	10	IAE 3177	
158	PHV	64	AE 3293	10	IAE 2813;IAE 3168	
159	PHV	90	AE 2816	10		
160	PHV	91	ohne Nr.	10		
161	PHV	92	AE 3144	10		
162	PHV	nochmals 64	AE 3293	10	alle Schieber auf IAE 3218	
163	PHV	60	ohne Nr.	10		
164	PHV	61	ohne Nr.	10		
165	PHV	62	ohne Nr.	10		
166	PHV	63	ohne Nr.	10		
167	PHV	58	AE 2799	10		zw.Geb. 4502/4401 Richt. 4402
168	PHV	59	ohne Nr.	10		
169	PHV	93	AE 2791	10	zw.Geb. 4502/4401 Richt. 4402	
170	PHV	94	AE 2779	10		auf Verkehrsinsel neben Kirche Richtung Bruecke
171	PHV	ohne Nr.	zw. Geb. 4407/08	10		
172	PHV	1	AE 2786	10		
173	PHV	2	EA 2576	10		
174	PHV	3	AE 2573	10		
175	PHV	56	ohne Nr.	10		
176	PHV	55	ohne Nr.	10		zw. Geb. 4410/4414
177	PHV	nochmals 55	ohne Nr.	10	zw. Geb. 4410/4414	

Nr.	Area	FES Hydr.Nr.	Water Dist.Plan Hydr. Nr.	Flush min	Schieber aufdrehen	Schieber zudrehen
178	PHV	54	AE 2767	10		
179	PHV	53	AE 2771	10		
180	PHV	51	AE 2774	10		
181	PHV	52	ohne Nr.	10		
182	PHV	50	AE 2766	10		
183	PHV	49	AE 2764	10		
184	PHV	48	AE 2762 A	10		
185	PHV	47	AE 2433	10		
186	PHV	nochmals 48	AE 2762 A	10		
187	PHV	45	AE 2437	10		
188	PHV	44	AE 2442	10		
189	PHV	43	AE 2306	10		
190	PHV	42	AE 2304	10		
191	PHV	34	AE 2424	10		
192	PHV	35	ohne Nr.	10		
193	PHV	36	AE 2427	10		
194	PHV	37	AE 2430	10		
195	PHV	38	AE 2273	10		
196	PHV	39	AE 2270	10		
197	PHV	40	AE 2268	10		
198	PHV	33	ohne Nr.	10		
199	PHV	32	AE 2421	10		
200	PHV	31	AE 2440	10		
201	PHV	30	AE 2412	10		
202	PHV	29	ohne Nr.	10		
203	PHV	28	ohne Nr.	10		
204	PHV	27	AE 2248	10		
205	PHV	2	ohne Nr.	10	auf Verkehrsinsel neben Kirche Richtung Bruecke	IAE 2808
206	PHV	3	AE 2576	10		
207	PHV	4	AE 2573	10		
208	PHV	5	AE 2569	10		
209	PHV	6	AE 2566	10		
210	PHV	7	ohne Nr.	10		
211	PHV	41	ohne Nr.	10		
212	PHV	26	AE 2264	10		
213	PHV	Commissary	ohne Nr.	10		
214	PHV	Commissary	ohne Nr.	10		
215	PHV	8	AE 2309	10		IAE 2250;IAE 2274
216	PHV	9	AE 2559	10		
217	PHV	ohne Nr.	AE 2555	10		
218	PHV	10	AE 2292	10		IAE 2561
219	PHV	nochmals10	AE 2292	10		
220	PHV	11	AE 2298	10		

Nr.	Area	FES Hydr.Nr.	Water Dist.Plan Hydr. Nr.	Flush min	Schieber aufdrehen	Schieber zudrehen
221	PHV	12	AE 2296	10		
222	PHV	18	ohne Nr.	10		
223	PHV	20	ohne Nr.	10		
224	PHV	21	ohne Nr.	10		
225	PHV	92	ohne Nr.	10		
226	PHV	19	ohne Nr.	10		
227	PHV	23	AE 2255	10		
228	PHV	24	AE 2254	10		
229	PHV	25	AE 2252	10		
230	PHV	22	AE 2258	10		IAE 2252 neben Hydrant
231	PHV	nochmals 25	AE 2252	10	IAE 2252 neben Hydrant	
232	PHV	15	AE 2280	10	IAE 2274; IAE 2250	
233	PHV	14	AE 2563	10		
234	PHV	13	AE 2284	10		
235	PHV	nochmals 12	AE 2296	10		IAE 7285
236	PHV	16	AE 2279	10	IAE 7285	
237	PHV	nochmals 25	AE 2252	10		IAE 2259; IAE 2250
238	PHV				alle wieder auf	
240	Koenigstuhl			10		
241	Edingen RR			10		
242	SAR			10		
243	Stem			10		
244	Stem			10		

9.1 GENERAL PROCEDURES

Annual water main flushing is the responsibility of the DPW, O&M Division, Sanitation Branch and FES. The results are documented in a water main flushing form. General procedures for water main flushing are:

- Follow the unidirectional flush plan
- Operate valves to isolate the section of the distribution system to be flushed;
- Open fire hydrants or flushing connections in a manner to conduct a unidirectional flushing, described in flush plan
- Document flushing activity and record visual water color and turbidity;
- Continue flushing distribution system section until the flushed water is no longer discolored or turbid.

9.2 DOCUMENTATION

Annual water main flushing is documented and stored the DPW, O&M Division, Sanitation Branch. Documentation includes the date of activity, the potable water system identification, the identification of the section(s) of the distribution system that were flushed, the duration of flushing, and a summary of the findings.
Annual water main flushing documentation is maintained DPW, O&M Division, Building No. 3962, Sanitation Branch and F&ES.

10.0 SANITARY SURVEYS

This section details the conduct of sanitary surveys. Section 3.3.1.4 of the GFGS requires to conduct sanitary surveys of potable water systems every 5 years for groundwater.

Sanitary surveys, by definition, are on-site reviews of the potable water sources, facilities, equipment, and operation and maintenance (O&M) of a public water system to evaluate the technical adequacy of such elements for producing and distributing potable water. The survey is based on a physical inspection of the potable water system and an evaluation of how the system is operated and maintained.

The Requirement to conduct a sanitary survey of potable water systems annually is intended to support the bacteriological monitoring program.
No annual requirement existes.
The regular performance of sanitary surveys provides additional assurance that potable water is safe.

Mr. Willnauer (C/Sanitation Branch), Ms. Sabine Salamon (Phys. Scien. Techn.) do field inspect potable water systems. They do:

- review water quality test data from the cities, CHPPM, PMA and own with the system operator and discusses sample results;
- review how and where water samples are collected to evaluate whether the test results from the cities, CHPPM, PMA and own are representative and accurate.
- review the potable water system bacteriological monitoring plan with PMA that identifies how and where total coliform bacteria samples are collected.
- the system operators perform routine tests of potable water for chlorine and fluoride (monthly record from each water station incl. chlorine testing and chemical demand) to ensure that proper test methods are being used. Apparatuses used are maintained and calibrated periodically by manufacture Hach, USF or in-house personal pending on piece of equipment. Proficiency Program is carried out quarterly thru CHPPM.
- any conditions that have the potential to affect potable water quality are examined by DPW, O&M Division, Sanitation Branch. Corrective actions are conducted and/or money for equipment is requested.
- any identified deficiencies are discussed with potable water system operators, Chief O&M and/or CHPPM-EUR and/or PMA;

The sanitary survey may identify deficiencies with regard to potable water systems. If a particular deficiency is considered an imminent health threat, immediate corrective action is required.

10.1 RESPONSIBILITY AND DOCUMENTATION

On a 5-yearly basis CHPPM-EUR conducts sanitary surveys on request of DPW, O&M Division, Sanitation Branch.
The DPW, O&M Division, Sanitation Branch gets/keeps report.

11.0 REFERENCES

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[Additional Reference